13 OCTOBER 1955 ONE SHILLING

ELECTRICAL TIMES

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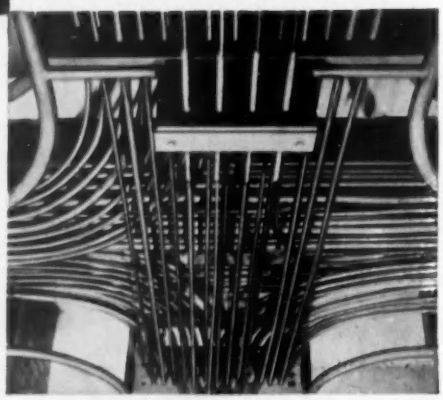
More and more J. & P. Aluminium Sheathed Cable is being used by discerning engineers.



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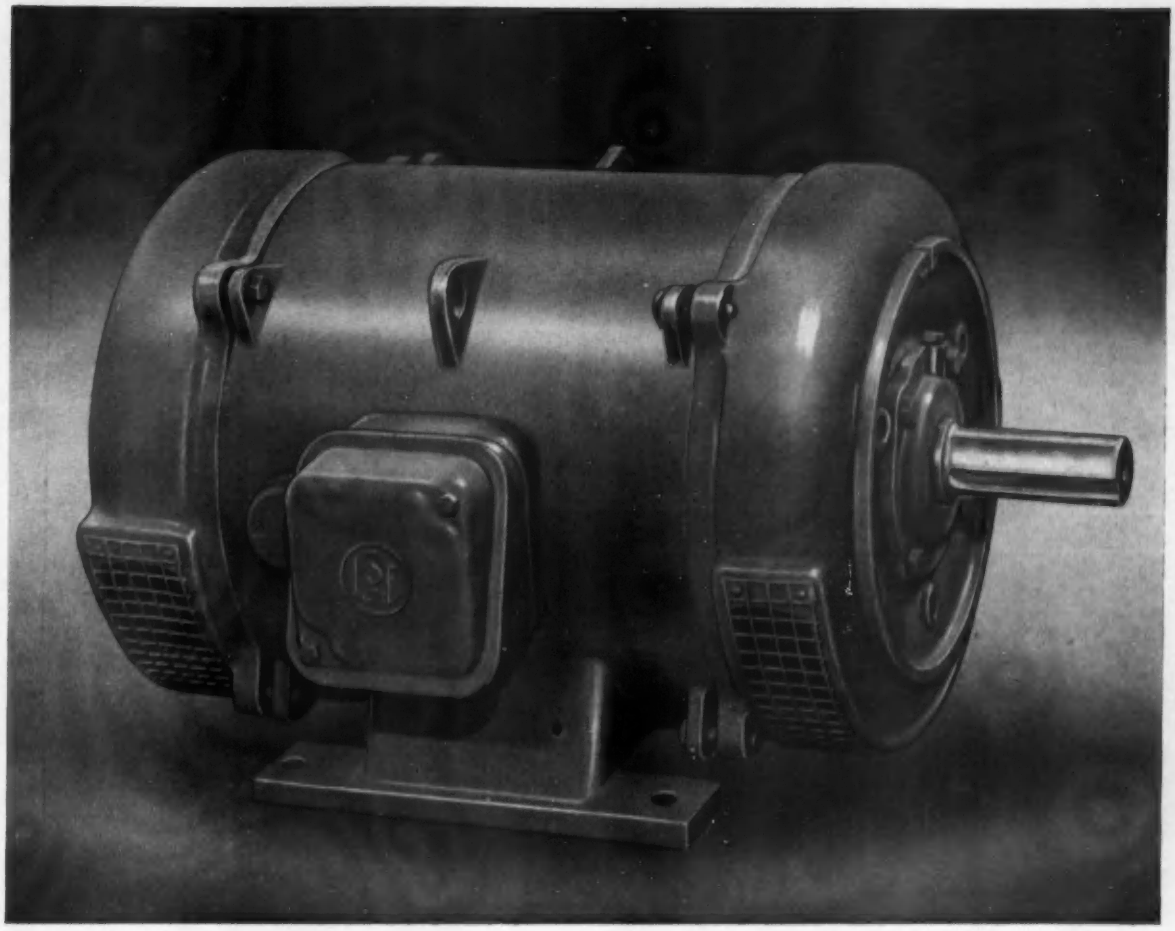

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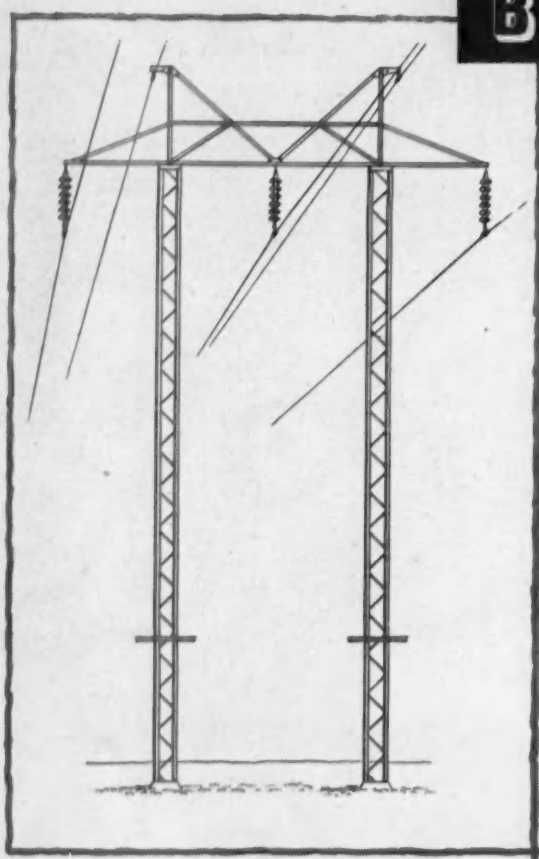

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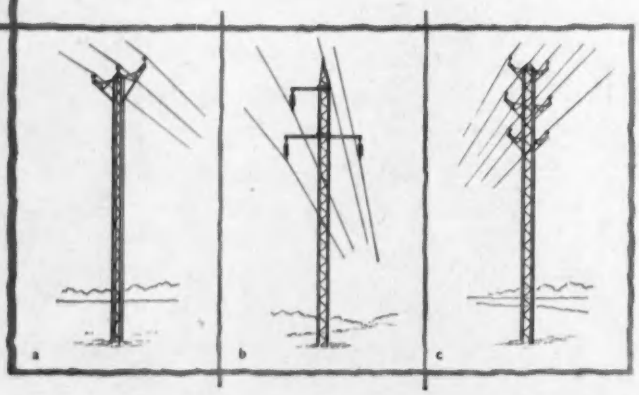
If you would like to know more about our activities—and the range of power line equipment we are able to supply, we will be glad to send you publications giving illustrated information.

above: 66kV H-type P.B. Pole

right: (a) 11kV P.B. Pole

(b) 66kV P.B. Pole

(c) 11kV Double-Circuit P.B. Pole



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REVO
REGD.

Street Lighting EQUIPMENT

Once again REVO equipment has been chosen for the "LIGHTS OF LONDON"—

A modern fluorescent street lighting scheme has been planned for the West End and the Westminster City Council has selected REVO Lanterns and Columns for the second stage of this important installation which includes—PICCADILLY—PALL MALL—ST. JAMES' STREET—ALDWYCH—CRANBOURN STREET—and sections of KNIGHTSBRIDGE—CHARING CROSS ROAD—COVENTRY STREET, etc.

REVO "Sol-Etern" Lanterns using three or four 5-ft. 80 Watt Fluorescent Lamps will be employed mounted on Columns similar in character to those already supplied by REVO for the lighting in PARLIAMENT SQUARE.

The installation of the equipment will also be carried out by the REVO Erection Department on behalf of the London Electricity Board.

N.B.—It is interesting to note that the new scheme will replace part of some 43 miles of existing REVO Lighting which has given good service for upwards of 25 years. The photograph illustrates the type of lantern and column chosen for the new scheme.

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TIPTON, STAFFS

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(according to speed)

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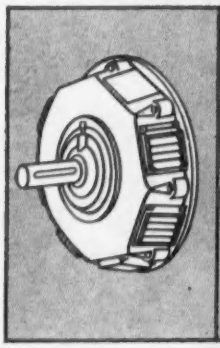
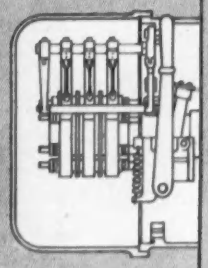
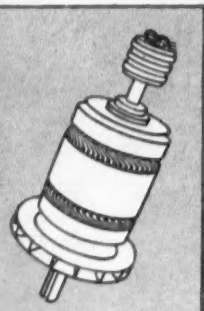
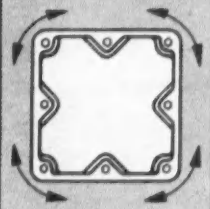
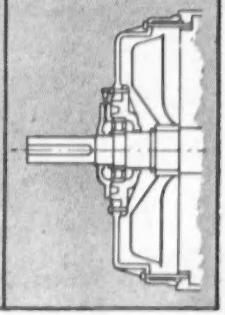
				
Fitted with loose louvres which can be rotated through 90° giving drip-proof protection in any mounting position.	Easily accessible. Brush lifting and short-circuiting gear with electrical interlock fitted as standard.	Mounted on cast-iron spider, keyed to shaft. Dynamically balanced to ensure vibration-free running.	Cast-iron cover may be rotated to give cable entry from any of four positions.	Cartridge housings give ample grease storage and easy dismantling. Securely locked against shoulders by bearing nuts

BROOK MOTORS LIMITED
HUDDERSFIELD

59/6

SenTerCet
RECTIFIER EQUIPMENT
REGISTERED TRADE MARK

LONGER LIFE for H. V. CABLE

Regular D.C. Tests reveal impending trouble

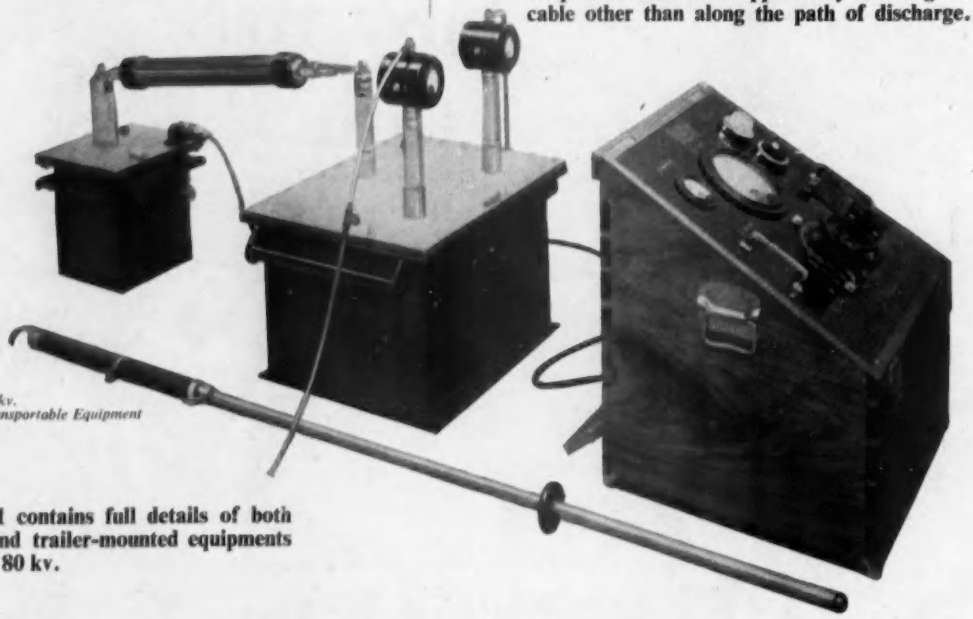
It has repeatedly been shown that D.C. tests will often indicate impending trouble in a cable which has survived an A.C. test. Regular D.C. tests for high voltage cables provide information which permits a higher level of maintenance, and thus considerably lengthens the life of a cable.

Here are a few more of the many advantages offered by 'SenTerCet' D.C. Cable Testing Equipment.

★ **Whilst the effect of an A.C. test depends fairly critically upon the time element, D.C., on the other hand, will usually fail a weak cable, or induce signs of failure, within five minutes.**

★ **Provides a highly sensitive check on the presence of moisture in cables, joints and terminations.**

★ **A few milliamps of D.C. can break down an incipient fault without appreciably affecting the cable other than along the path of discharge.**



33 kv. Transportable Equipment

Bulletin F/CT.1 contains full details of both transportable and trailer-mounted equipments from 3·5 kv. to 80 kv.

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RECTIFIER DIVISION: EDINBURGH WAY · HARLOW · ESSEX

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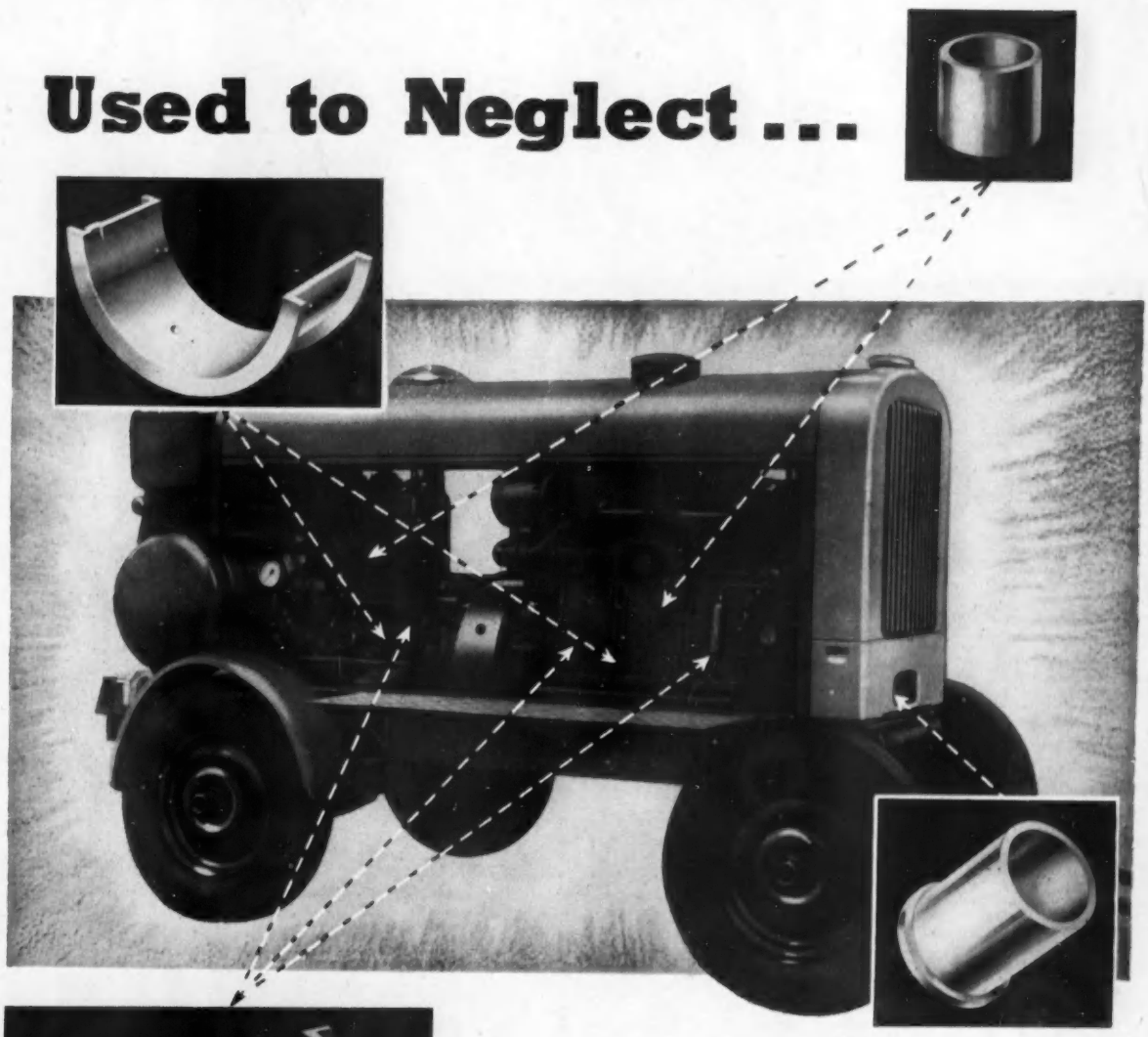

This twin cylinder diesel compressor set will have to work at full pressure for long periods, under arduous conditions and with very little attention. The accuracy and strength of BIRSO non-ferrous castings are relied on to give unfailing service, year in, year out. Illustrated are some of the BIRSO phosphor-bronze castings used in the set, ranging from main bearing shells to connecting rod and starting-handle bushes. They are all cast to the same exacting specifications and precision-machined in our own extensive machine shops.

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Castings from a few ounces to 10 tons in phosphor-bronze, gun-metal, aluminium-bronze, manganese-bronze and light alloys. Precision-machined bushes and bearings. Specialists in high-tensile aluminium-bronze castings, centrifugal-cast wheel blanks, and chill-cast rods and tubes.

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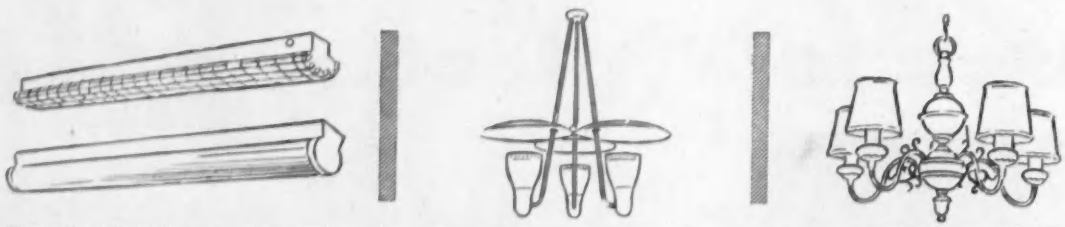

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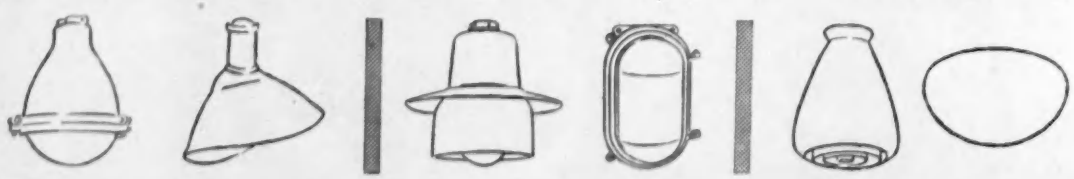

AUTOMATIC
STREET LIGHTING CONTROL

The up-to-date Fluorescent Lighting Scheme installed at Holborn is controlled by Horstmann Type "Q" Time Switches.
The time switch is designed to control two circuits and it can be arranged to reduce main lighting at or about midnight when traffic is less and full lighting is not essential, and finally to switch OFF at dawn.

A full range of HORSTMANN Time Switches is available to meet all the demands of modern public lighting control, and 50 years of design and manufacturing experience ensure unfailing reliability under varying conditions of service.

HORSTMANN

Photograph by courtesy of The General Electric Company Ltd.

THE HORSTMANN GEAR CO LTD
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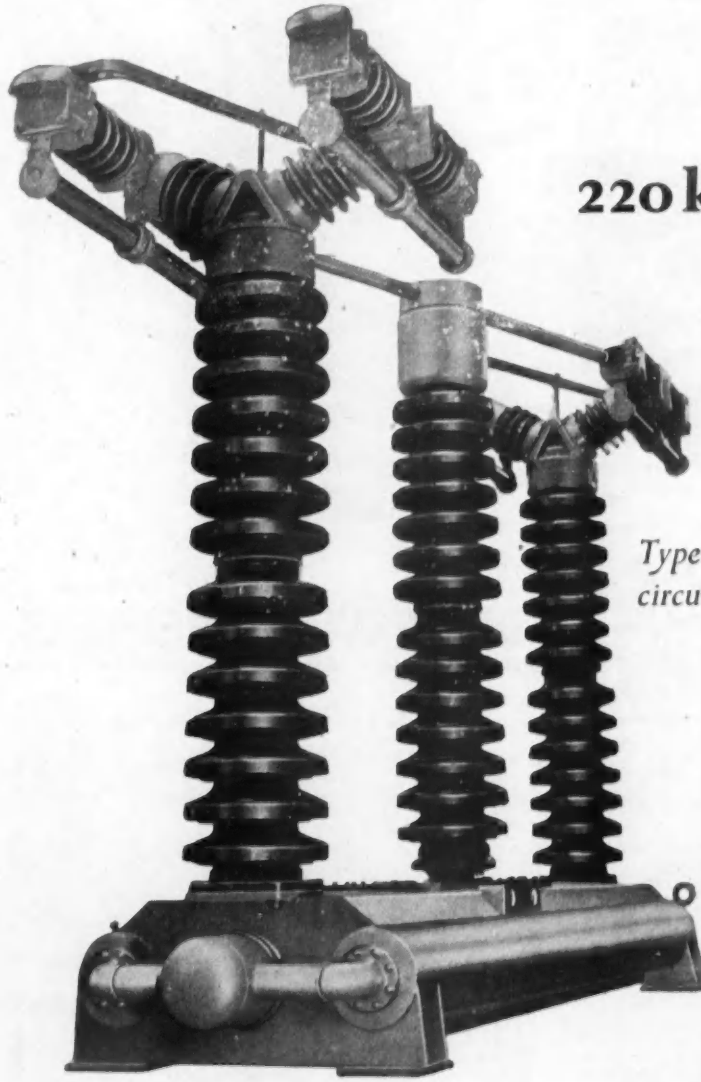
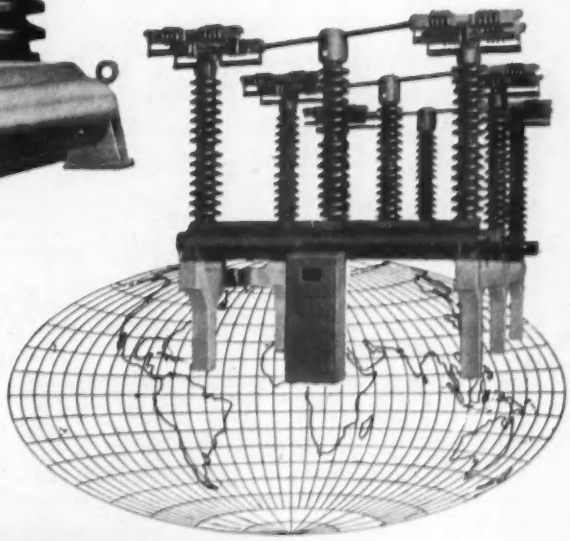


220 kV to 300 kV

Type GA Multi-break air-blast circuit-breaker.



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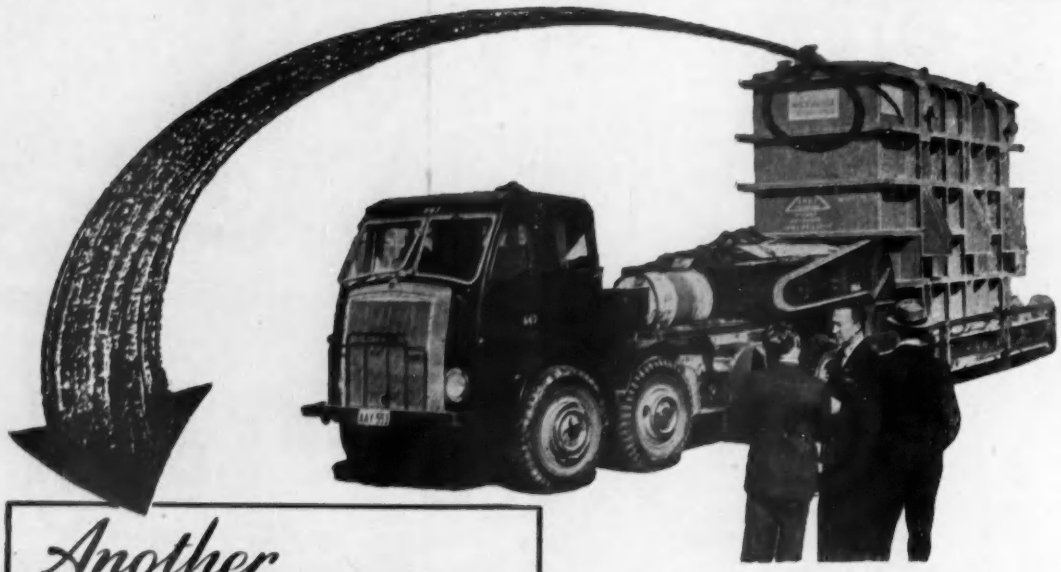

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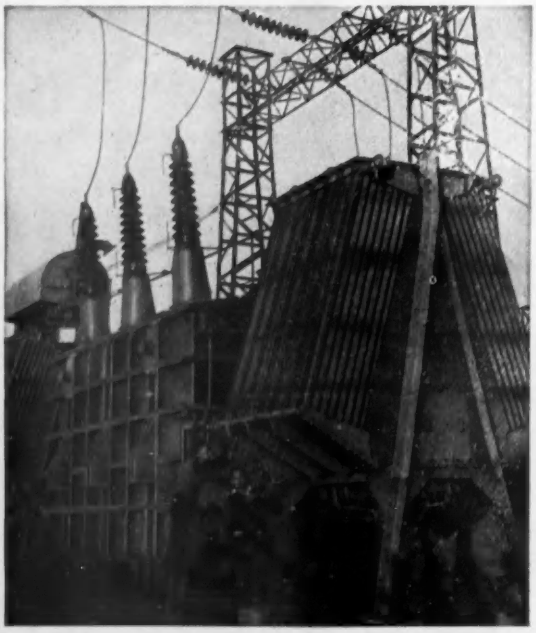
FOR SERVICE OVERSEAS

MONTH after month large Hackbridge transformers leave the Works for destinations extending to the most distant parts of the world. The illustrations show the arrival and installation of one of five 30,000 kVA 132/33 kV type ON/OB Hackbridge transformers for the Electricity Commission of New South Wales.

Over 21 million kVA of Hackbridge transformers have been manufactured, including some of the world's largest units.



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Lighting output Ratio exceeds 85%. Balanced distribution — 10-25% upward light.

High mechanical strength — Resists corrosion.

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Ease of installation.

White stove enamelled interior.

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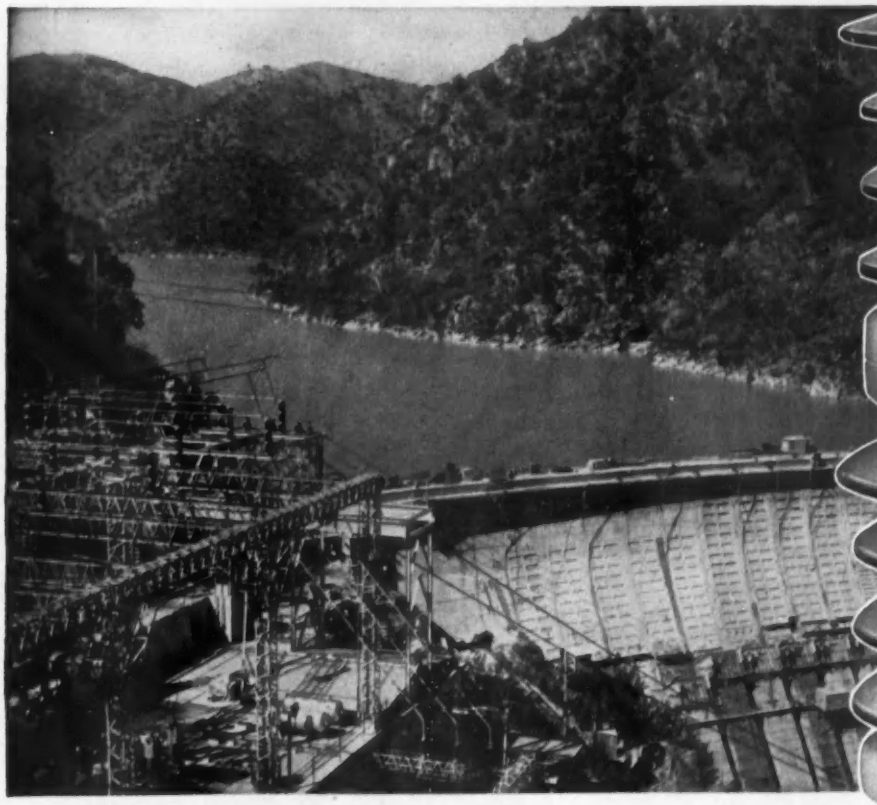
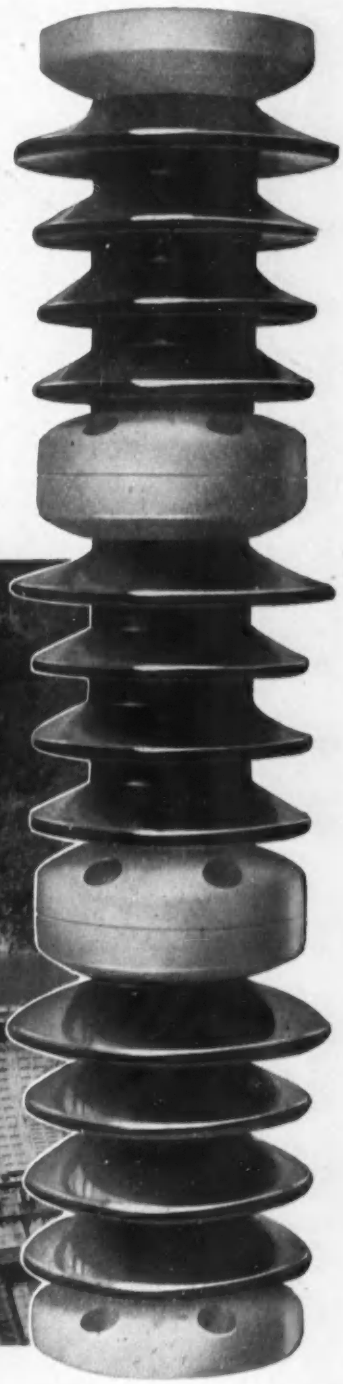
Cylindrical Post Insulators in New South Wales





The Burrinjuck 132 kV. switching station was equipped with Cylindrical Post Insulators type P.703. This is one of many stations on the New South Wales Public Works Department system equipped throughout with S.P.P. Post Insulators for 132 kV., 110 kV. and 66 kV.

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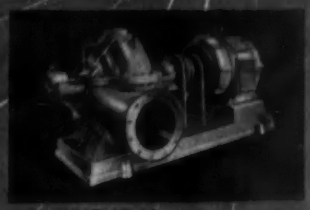

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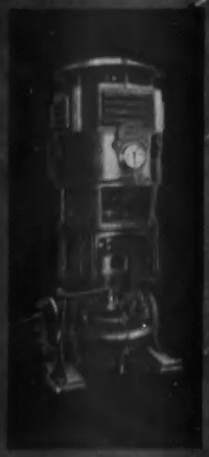
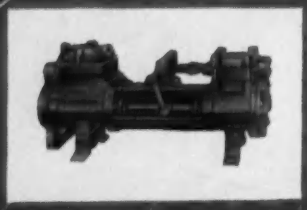


NUMARINE



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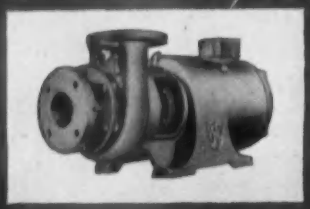
POWER



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When it's a question of pumps the engineer goes to

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It's all very well you saying that our advertising must be unusual and stimulating and what have you,

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Can't think why you had this idea of making *us* into a PYRAMID!

I mean the message we have for people in the Trade is perfectly straightforward.

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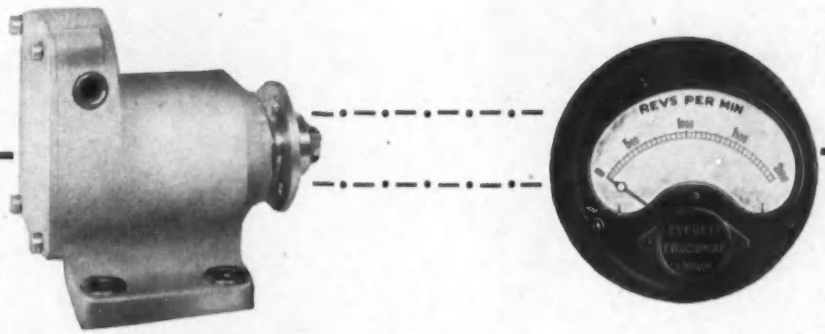

Typical speed transmitter for floor or bracket mounting.

Disc scale indicating speedmeter.

Portable speed recorder.

Everett Edgcumbe Speedmeters employ a small permanent magnet alternator to generate a voltage proportional to speed.

The speed indicator or recorder of the rectifier, moving coil type, can be situated at any reasonable distance away.

There are no commutators, slip rings or rubbing contacts; the circuit and the whole equipment is robust, reliable and accurate.

Special types of speed transmitter are available for low rotational speeds (below 500 r.p.m.).

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Recording instruments are of the well-known Inkwell pattern with continuous roll chart, central ink reservoir, and with magnetic damping.

Both panel mounting and portable type can be supplied.

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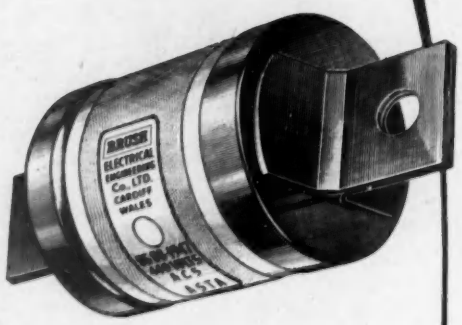

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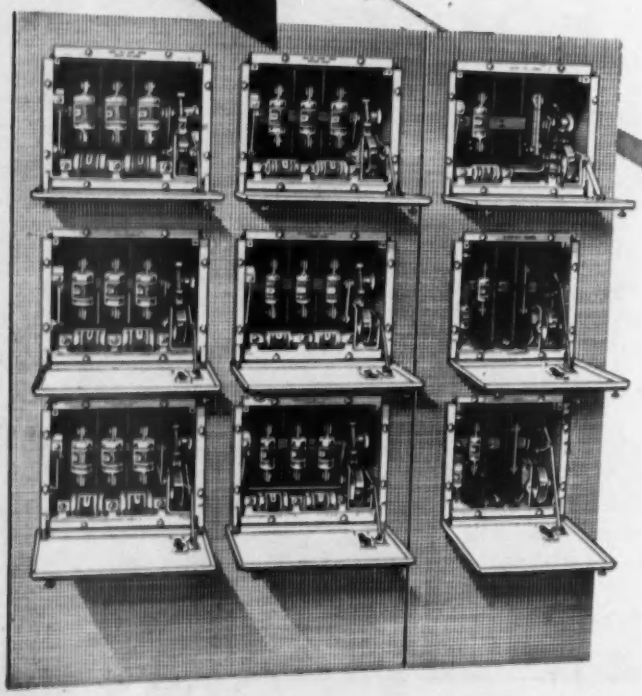

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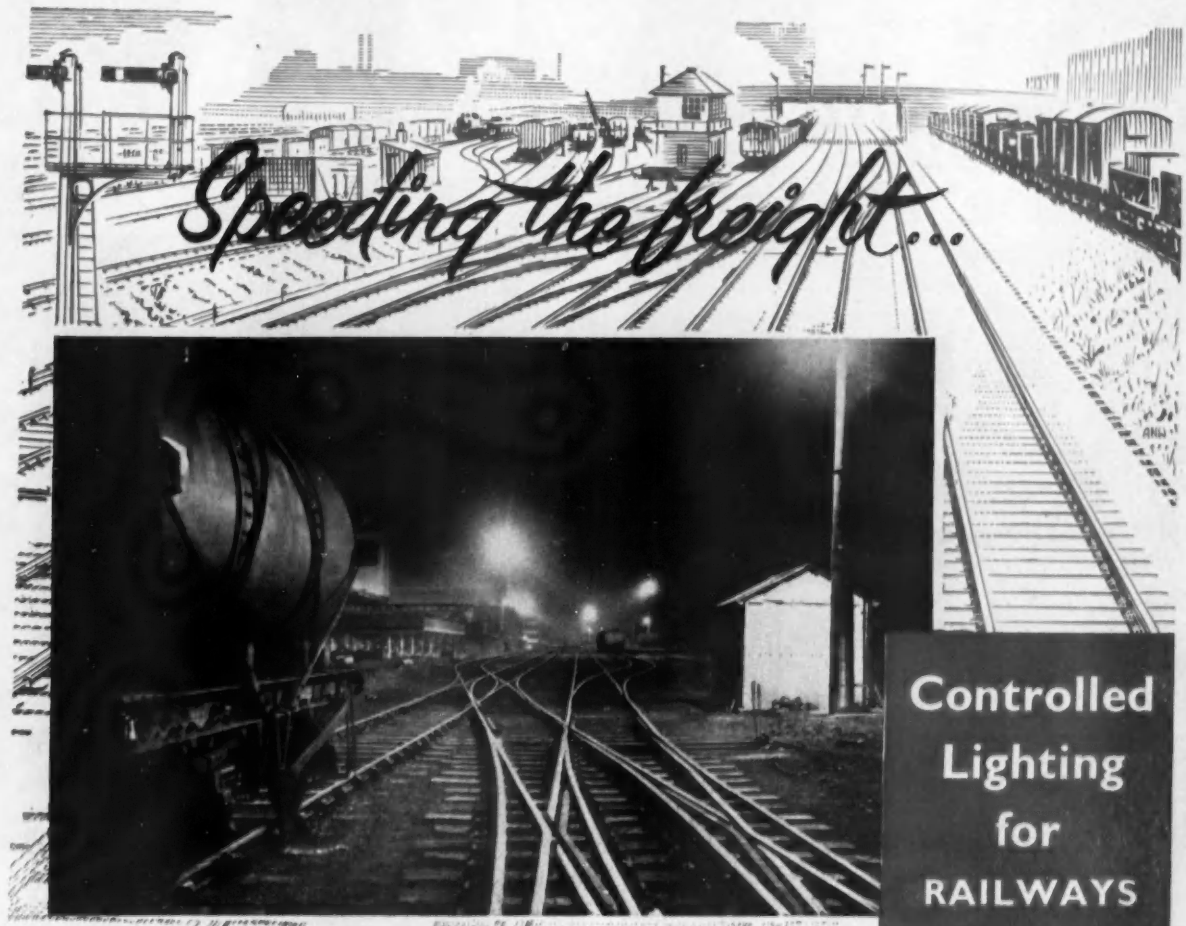

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The Holophane System of illumination is applied to every field of industry and commerce, and units are available for interior and exterior illumination. Please consult our Technical Service Department regarding your problem.

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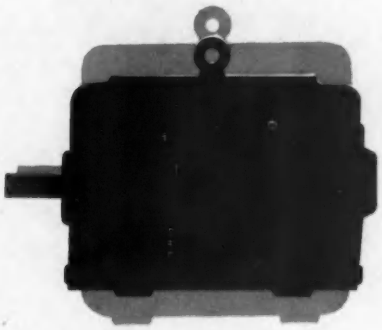

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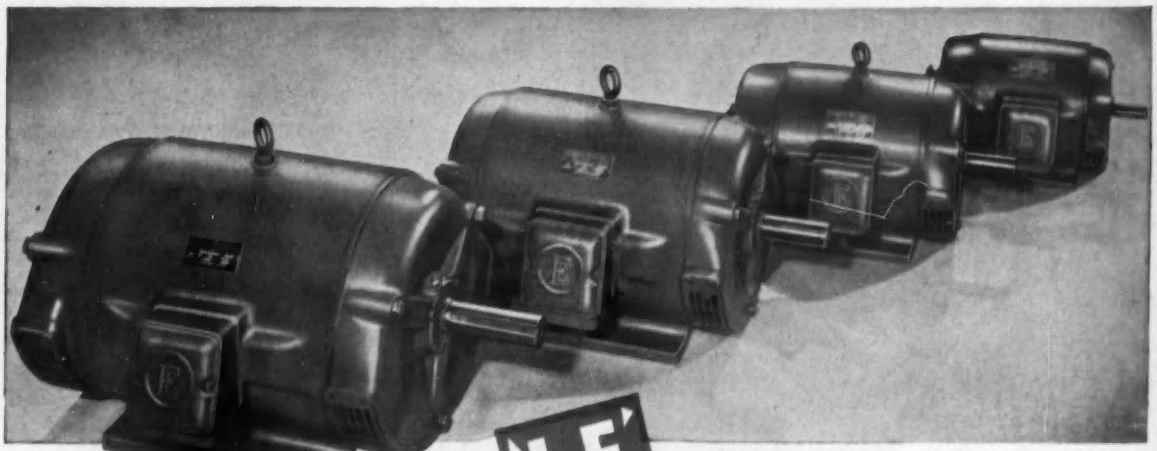

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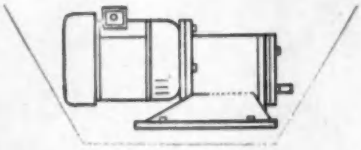

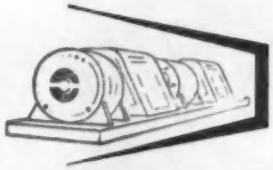

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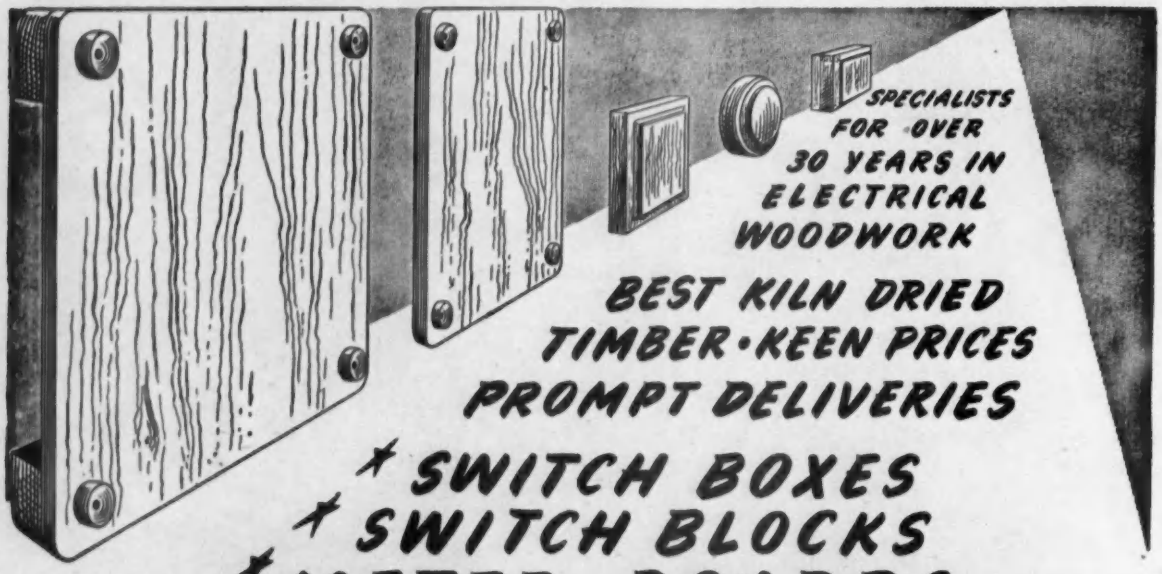
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Margot Lovell

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Jackson cookers

in 'Design for Living'

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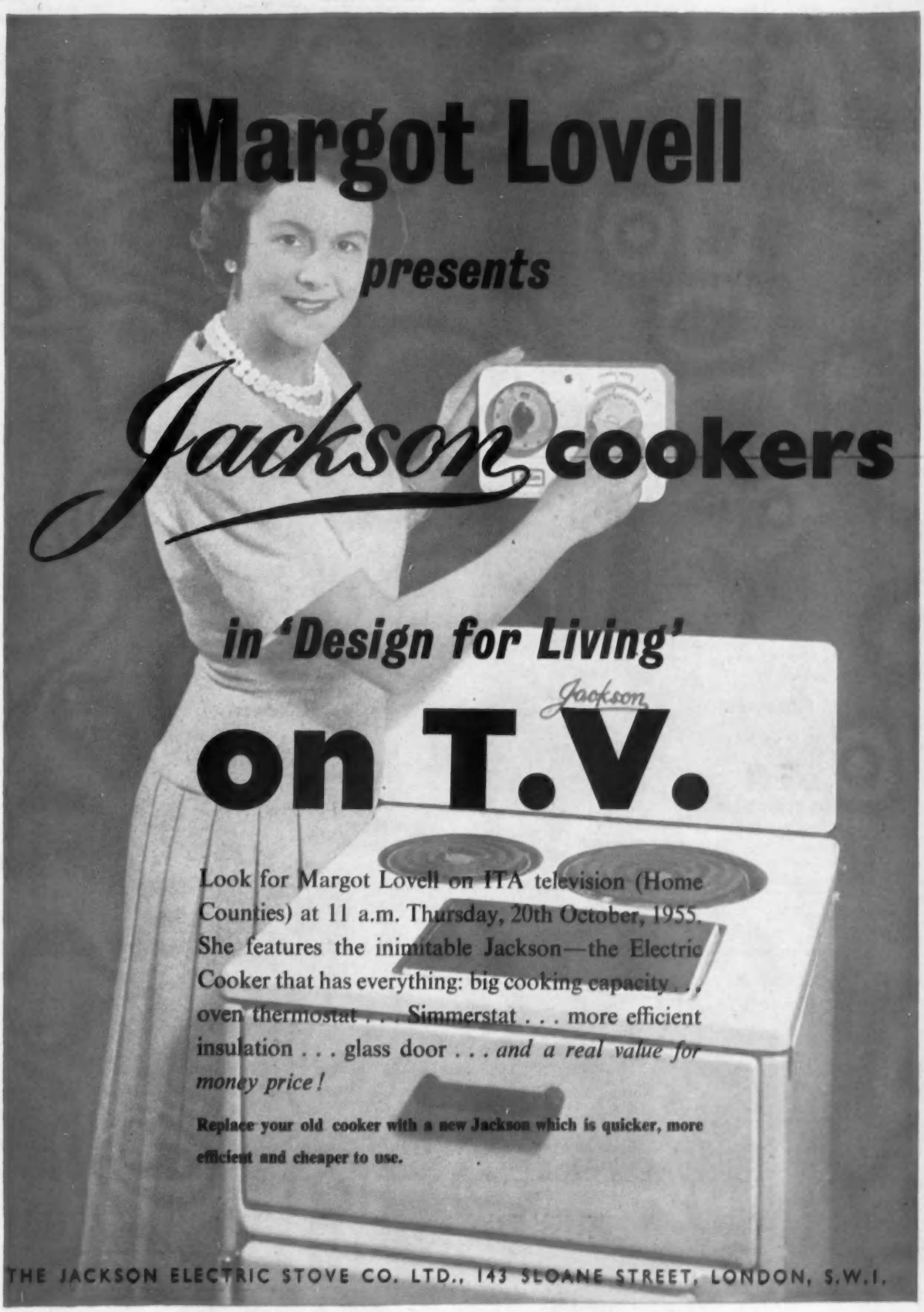

Look for Margot Lovell on ITA television (Home Counties) at 11 a.m. Thursday, 20th October, 1955. She features the inimitable Jackson—the Electric Cooker that has everything: big cooking capacity . . . oven thermostat . . . Simmerstat . . . more efficient insulation . . . glass door . . . *and a real value for money price!*

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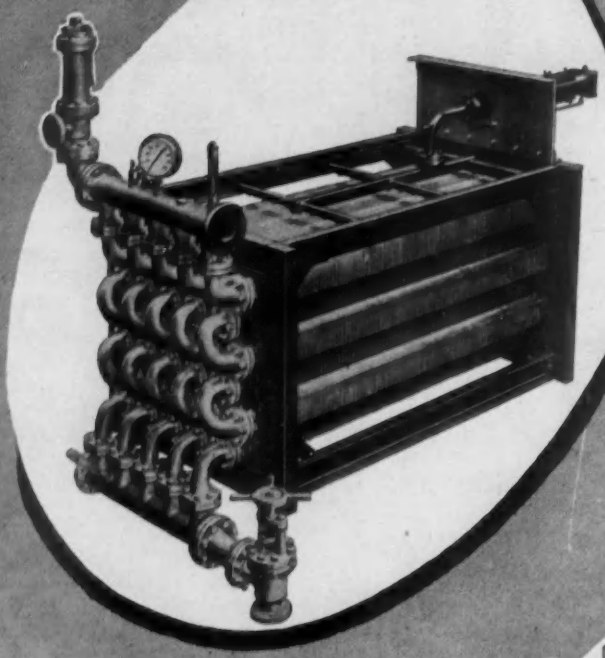

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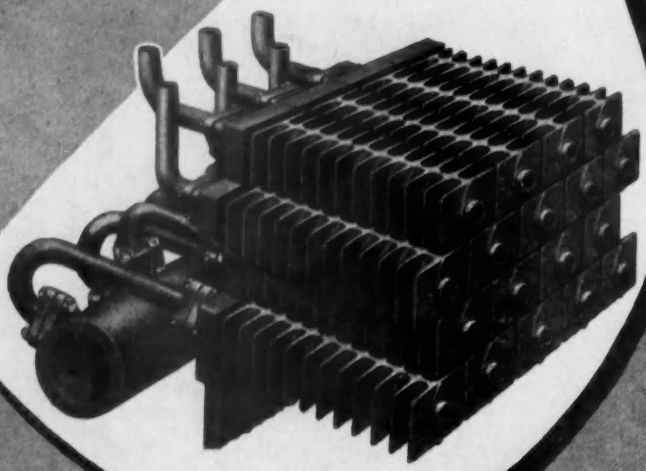

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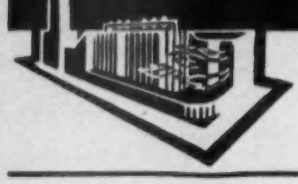

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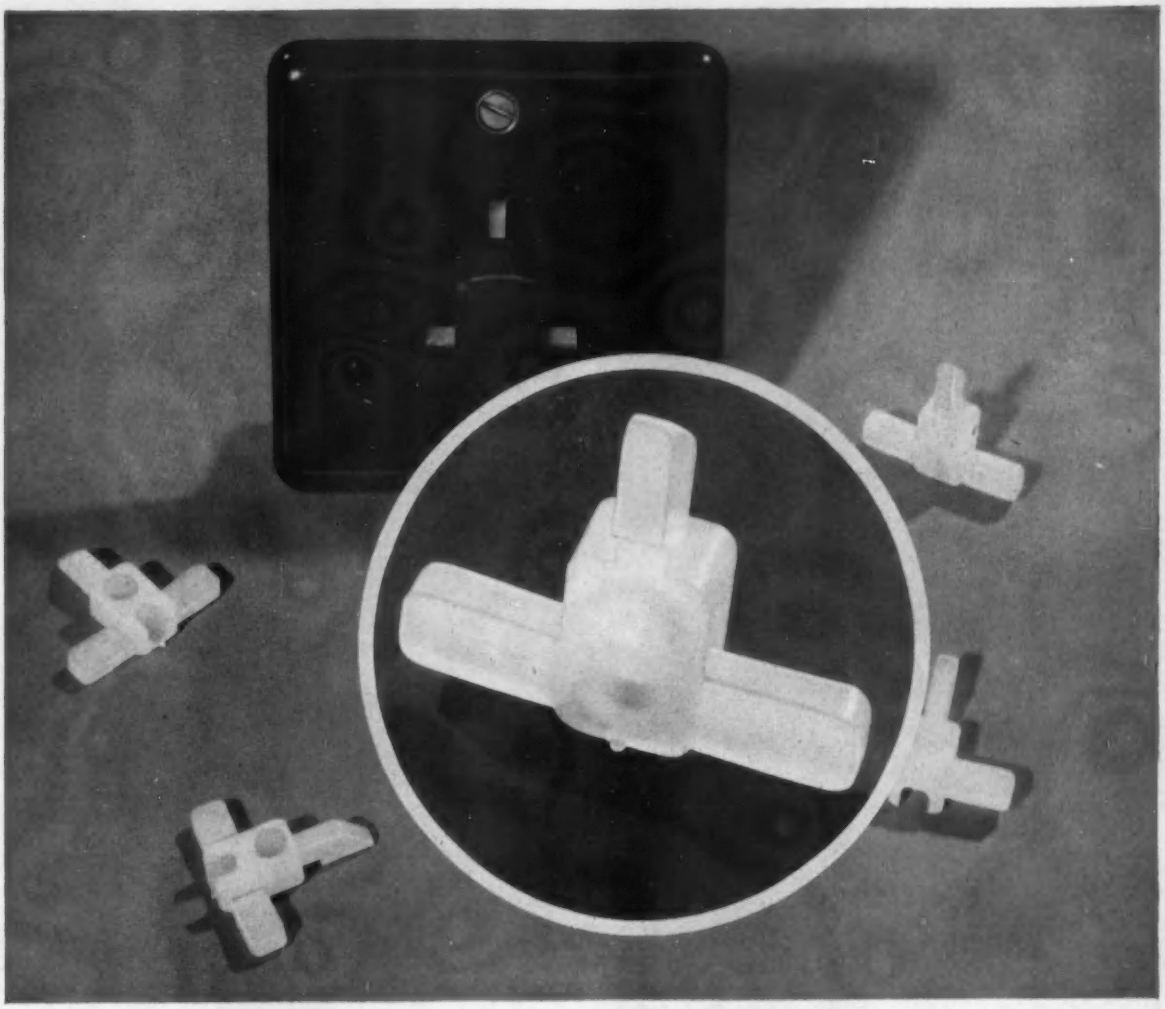

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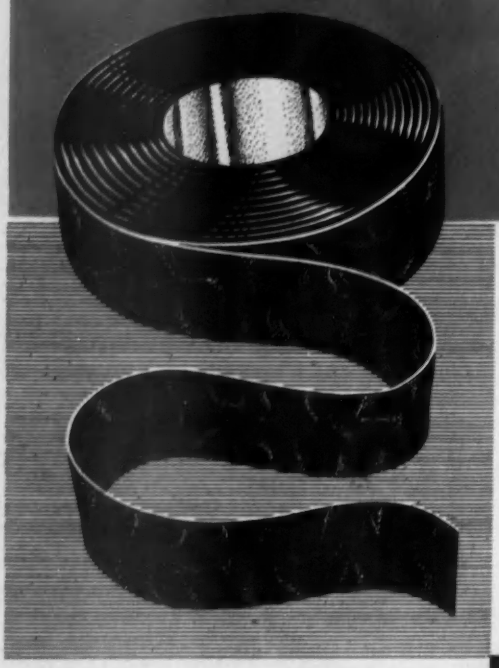

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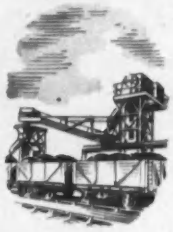

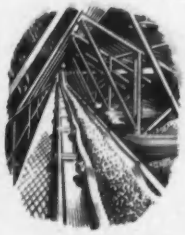

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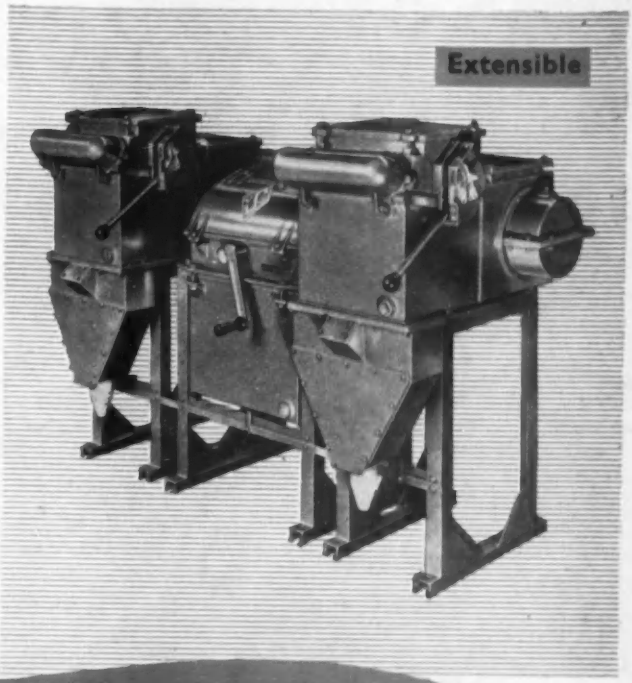

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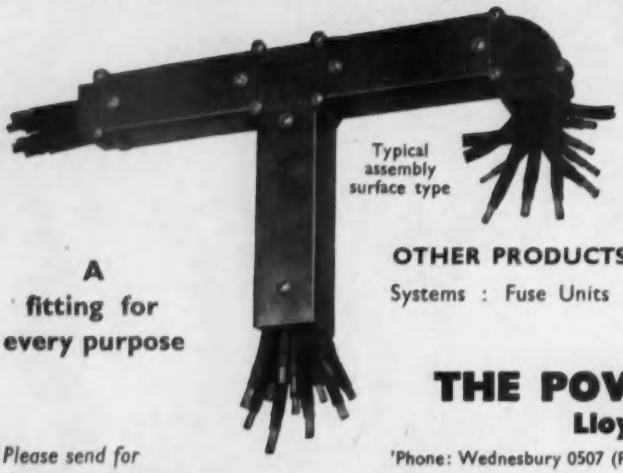
A typical purpose-made Cable Trunking installation carrying control cables



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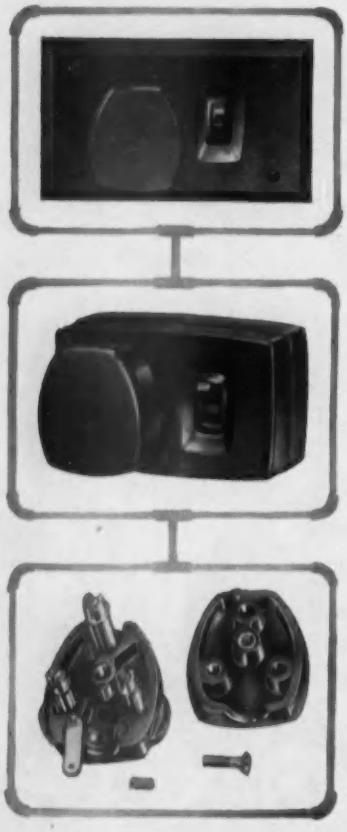

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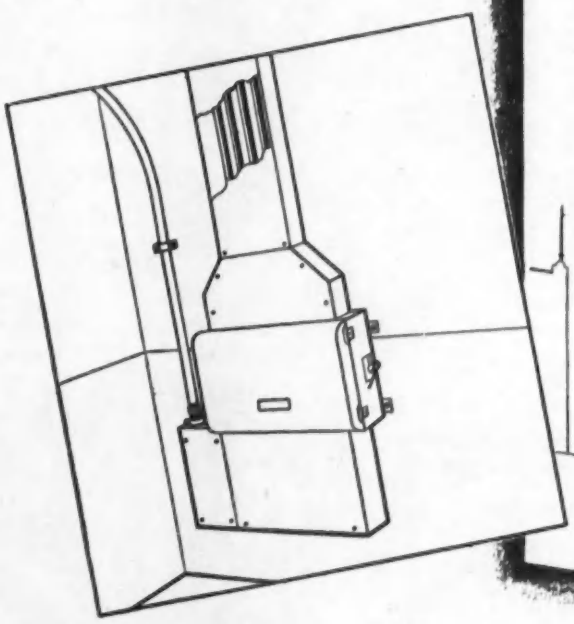

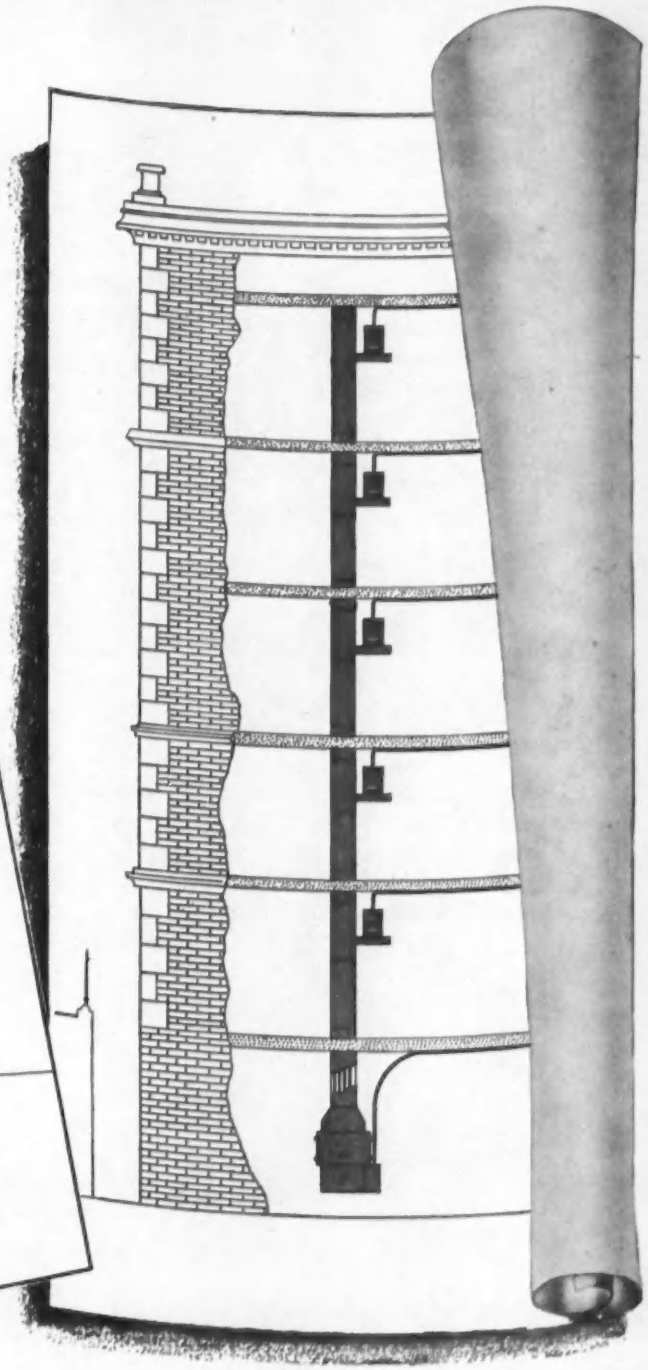

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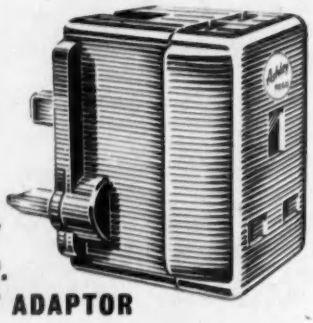

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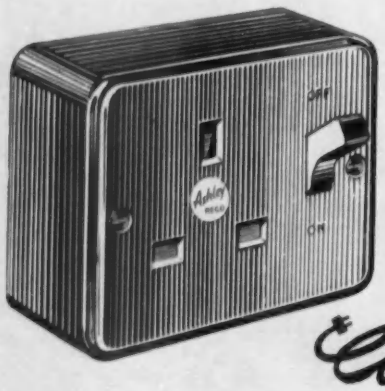

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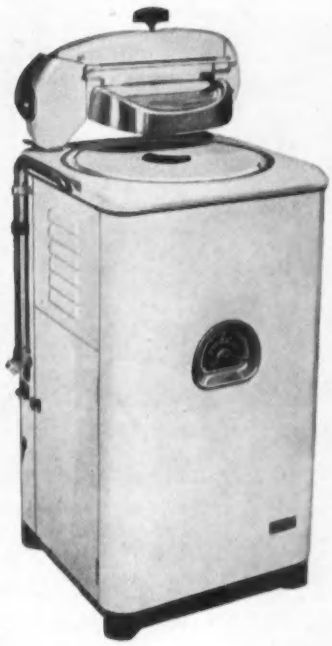

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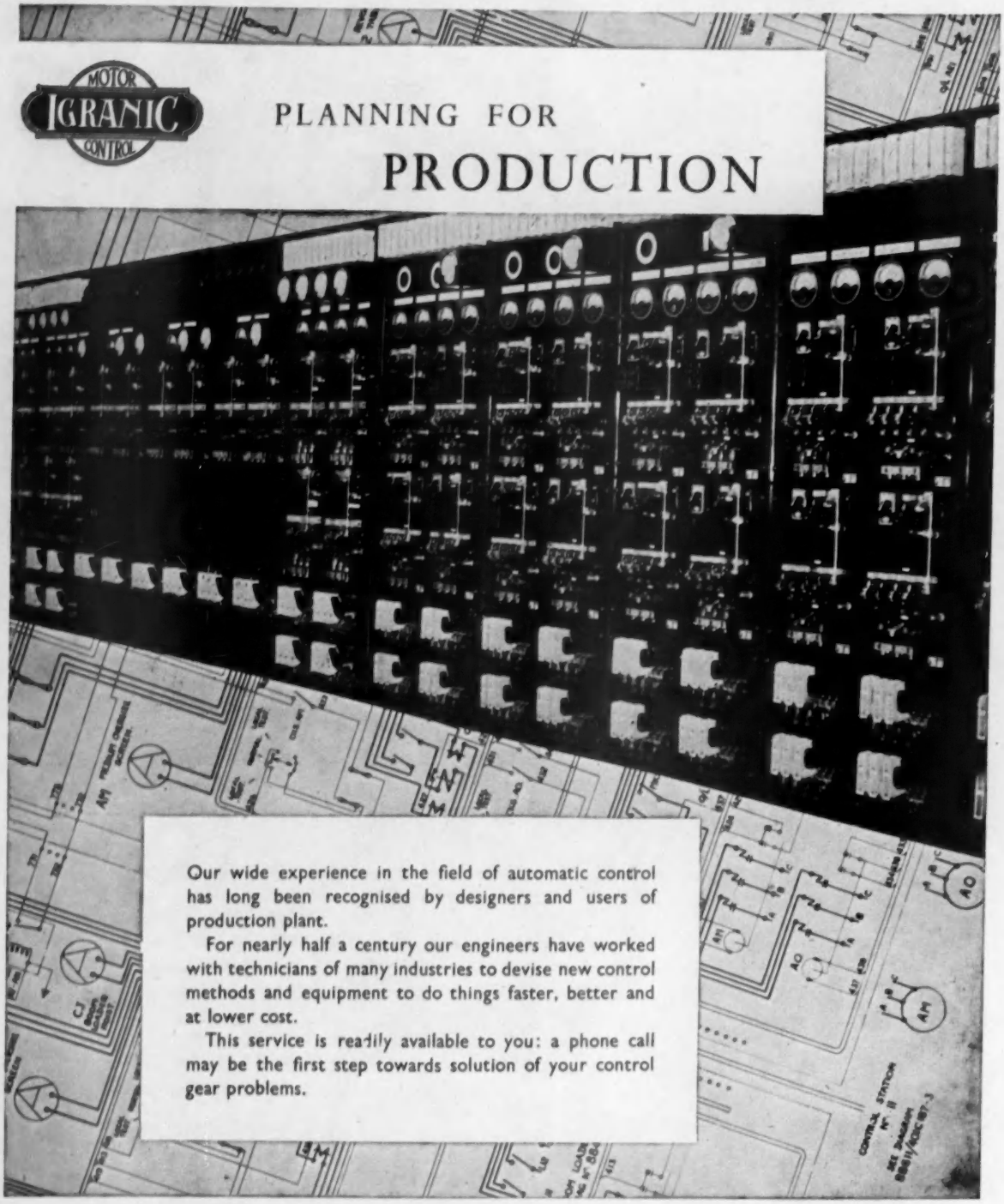

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A.29

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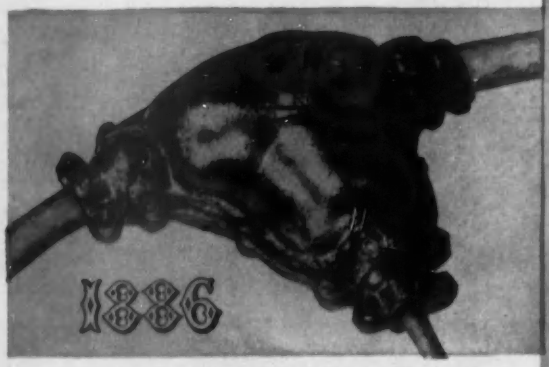

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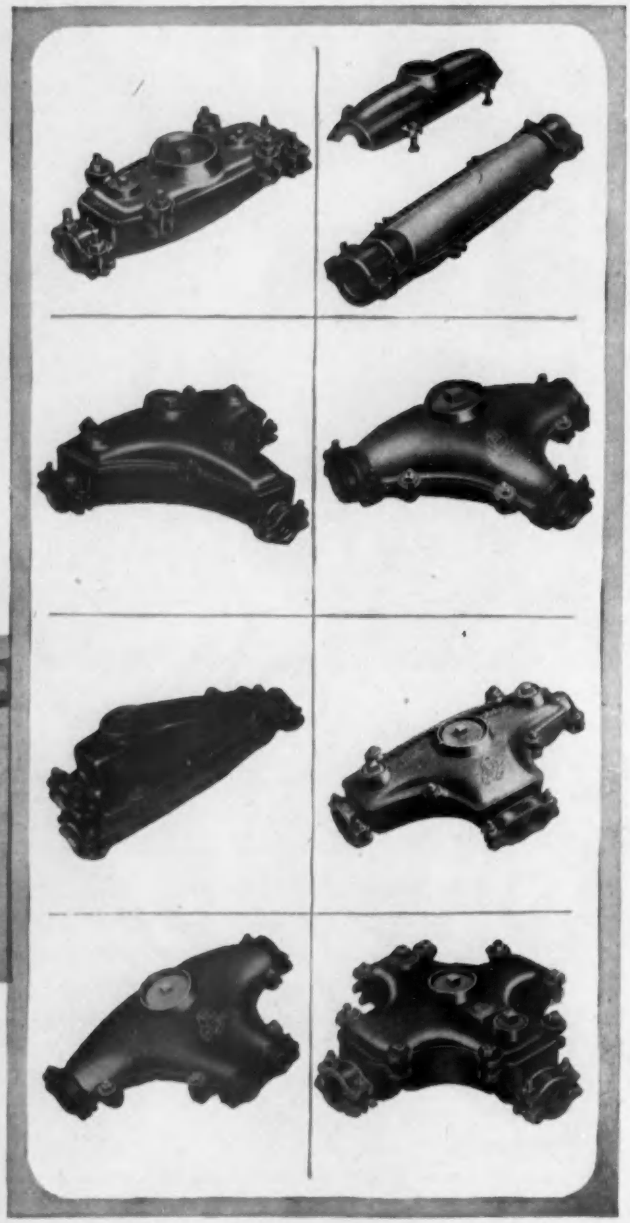

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10V.	250μA.	10V.	1A.	*Maximum indication 20MΩ.*
25V.	1mA.	25V.	2·5A.	0—2,000Ω — using internal batteries.
100V.	10mA.	100V.	10A.	0—200,000Ω — using internal batteries.
250V.	100mA.	250V.	—	0—20MΩ — using internal batteries.
1,000V.	1A.	1,000V.	—	
2,500V.	10A.	2,500V.	—	0—200MΩ — using external batteries.

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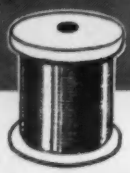

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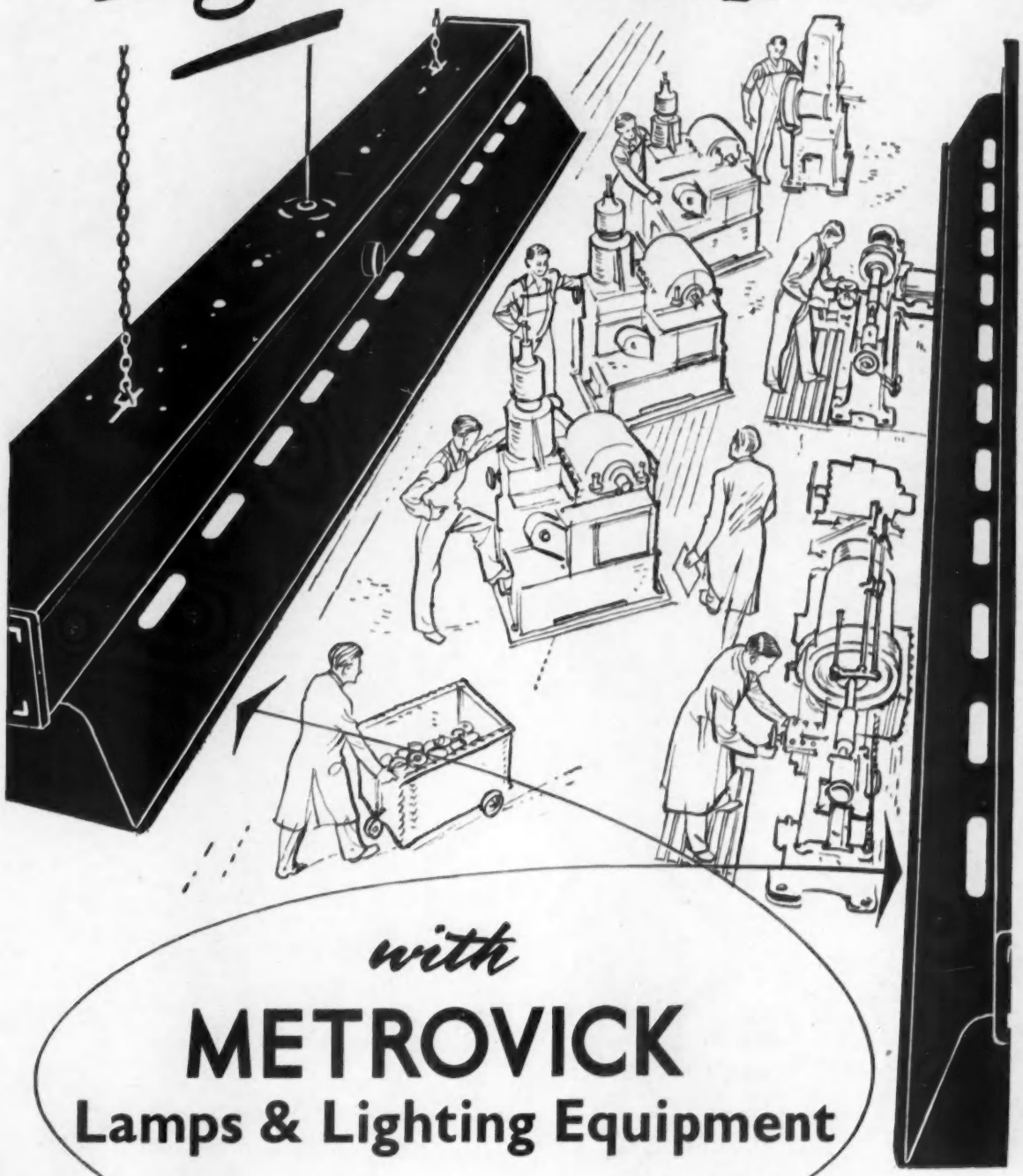

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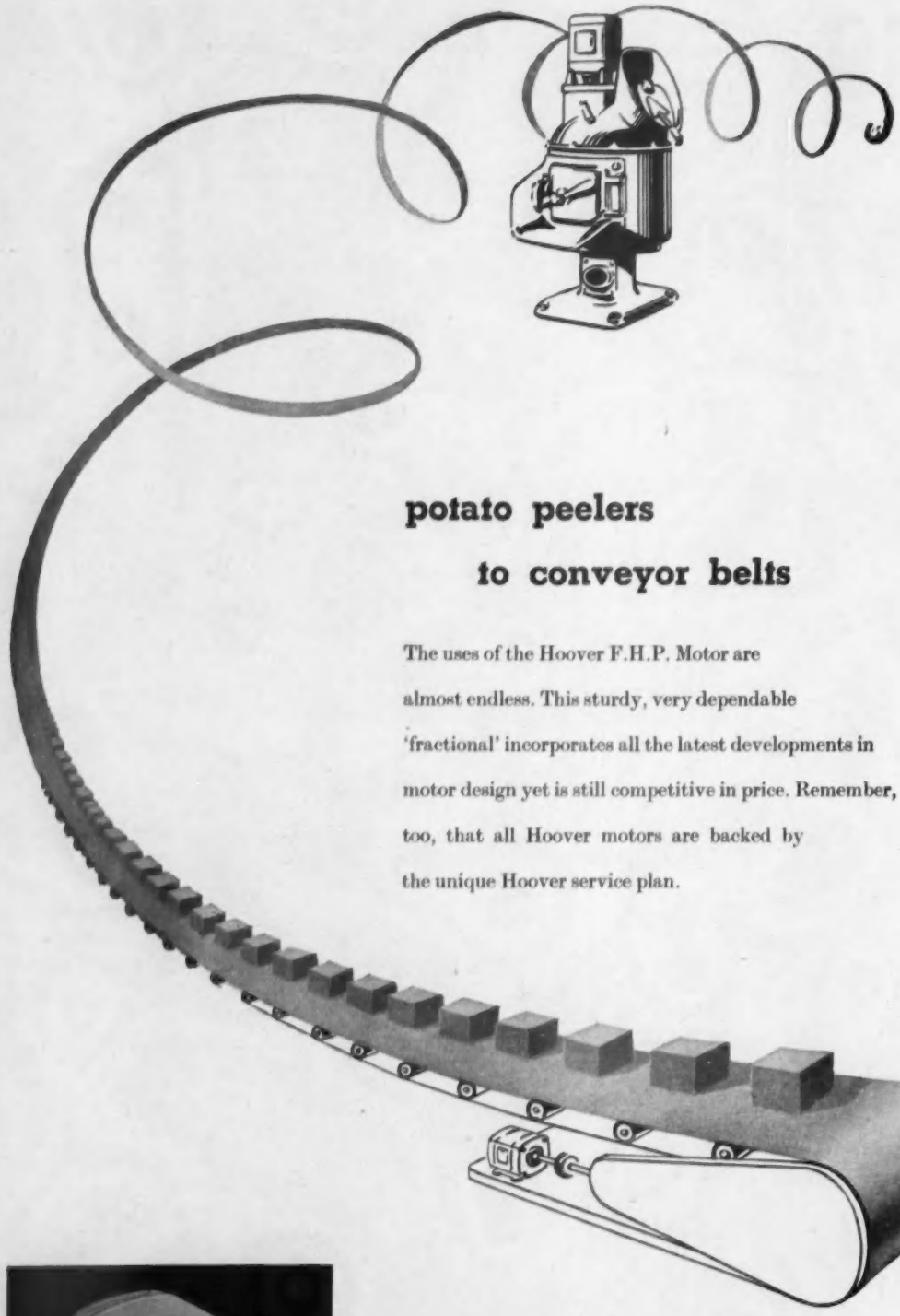

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ELECTRICAL TIMES

THURSDAY, 13 OCTOBER, 1955
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D

ENGINEERING WITH SYNTHETIC MATERIALS

The position of synthetic substances in the engineering field is steadily becoming more established. Traditional materials are giving way to these newcomers, and added impetus to the process is being provided by the general rise in price or poor availability of several important minerals. A glimpse of the future was given by Sir George Nelson in his Presidential Address to the I.E.E. when he went as far as to visualise the possibility of developing a type of synthetic material which would act as a replacement for structural steel, thereby releasing iron ore for use in its unique field of ferro-magnetism. The ability of synthetics to replace steel has indeed already been shown by the substitution of resin-bonded fibreglass for motor car bodies and by the development of heavy-duty gearing machined from nylon; although in the latter case the object is less to save steel than to take advantage of the shock-resisting, good-wearing and self-lubricating properties of nylon itself. In another field, as Sir George remarked, the development of long-chain polymers has enabled pipes for water and corrosive fluids to be produced at a fraction of the price of their metal equivalents, thereby releasing such minerals as copper and lead for electrical usage where their properties can be used to better purpose. The immediate post-war attitude of doubt towards many products of the plastics industry has now been overcome and all fields of engineering are beginning to benefit from their application.

FAIR TRADING CLASSES

One of the principal objects of the Electrical Fair Trading Policy is to ensure "that the functions of each section of the industry are defined and understood." In the preparatory work for the new edition of the Policy published last week, this aspect evidently received particular attention. Definitions of contractors, retailers and those contentious categories "special large buyer" and "recognised user," have all been modified; and all in the direction towards greater precision. The contractor is now required explicitly to have some technical training; retailers to qualify must offer after-sale service on products handled; and the special classes of buyer and retailers only qualify for preferential discounts in respect of purchases for their own use and not for resale. These changes will command a general welcome in the trade, and in so far as they are applied strictly, they will remove some of the causes of dissatisfaction about trading policy so strongly voiced at meetings of various electrical associations. It would

be unrealistic to assume that the definitions will be rigidly respected in every case, but it is equally unwise to underrate the effect of the new changes. Especially where contractors and retailers are concerned, the new definitions will exercise an increased pressure towards ensuring that members of these sections of the industry do in fact behave, to quote again from the Fair Trading Policy, so that "the public may be well served and the cause of electricity advanced."

COPPER COMES DOWN

When dealings in copper were freed from Government control in August 1953 the price at first quoted on the London Metal Exchange was about £230/ton. Many factors have contributed to a steady rise from that level and towards the end of August last we were commenting in these columns on the startling level of £400/ton which had been reached. Since then the market price of copper has fallen by over £50/ton, and the question is being asked, are copper prices on their way to permanently more reasonable levels? It is natural to look for some guidance in market prices for three months' deliveries, but these show no abnormal margin from those for immediate sale. A new aspect of the situation compared with earlier price fluctuations has, however, appeared with a drop in comparable U.S. prices; and the U.S. market, which has so great an effect on world prices, is showing signs of uncertainty about the future. If this indeed is a sign that prices are likely to consolidate at a level appreciably below the recent high mark, it will be welcome to all sections of the electrical industry, but particularly, of course, to the cable makers. Not only will product selling prices be eased for them, but a lower price for copper will bring an easement of the problem of financing ever more expensive stock requirements at the time of a credit squeeze. But a word of warning must necessarily accompany any comment on London Metal Exchange copper prices as they affect cable making. The relation of the market price quoted to what is paid by the cable makers is always complicated, but the position is made more confused at present by the special prices offered by the Rhodesian Selection Trust to certain large customers. These prices are taken into account in calculating the copper price used in cable contracts and recently they have exceeded the market price.

LOWER DEMAND FOR TRANSFORMERS

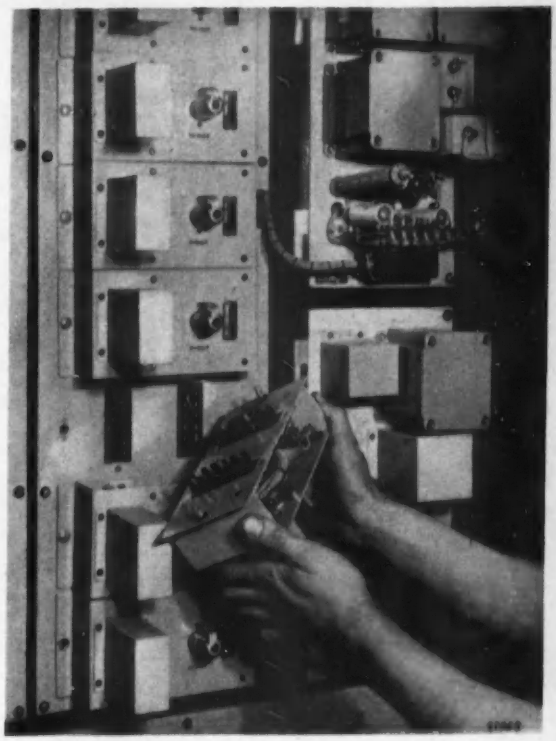
The picture of production of heavy electrical plant in 1954/55 presented by the annual O.E.E.C. report on deliveries and orders is necessarily broad, for all the countries within the organisation are considered together as a single entity. Certain widespread trends can nevertheless be discerned. There is confirmation that the average size of generating sets is rapidly increasing and with it the move towards the adoption of large unit boilers. It is also significant that the member countries are reported as exporting a considerably lower percentage of their production than in 1950; a direct indication of the steadily growing power demand within the industrialised countries of Europe. An unusual feature, however, is the fall in orders for medium and large power transformers (5 MVA and over); the first recession reported since 1948. No reasons are given for this unexpected set-back in a market which is well known for its competitive nature. A possible factor is that the past few years have seen the overtaking of arrears in distribution systems consequent on the war, and that progress is now becoming more matched to the growth of generating capacity. Justification for this view is given by the substantial decrease in orders for the next three to four years, which at the rate of shipment scheduled for next year, represented in April 1955 about 19 months' production. This compares with 22 months' work in April 1954. Additionally, past figures have shown the rate of increase in demand for transformers since 1948 to have lain within the range of 28% to 48% per annum—considerably higher than those recorded for other major equipment.

U.N. NUCLEAR PLANS

The Geneva Conference on the Peaceful Uses of Atomic Energy was held under the auspices of the United Nations, and after the signal success achieved, it is not surprising that a U.N. committee has been considering a date for another Conference along such lines. 1958 has been suggested, and certainly an international conference held any earlier would be in danger of becoming an anticlimax, due to relative lack of new material of major importance, even given the great pace of nuclear development. By the time such a conference comes to be held, the United Nations should have in operation a specialised agency charged with encouraging and facilitating international co-operation in the nuclear field. Details for this are at present under discussion, again in committee. The outcome will affect significantly the speed with which nuclear energy is brought into use throughout the world.

FREEDOM FOR BETTER LIGHTING

Inadequacy of lighting in many homes in this country is no new theme for lighting engineers, but in his presidential address to the Illuminating Engineering Society this week, Mr A. G. Higgins had some new points to make. He agreed with the generally accepted conclusion that more education is needed to convince people of what they are missing with their present low levels of lighting, but he went on to argue that even if an educational campaign along these lines were successful, it would be difficult for many of the "converted" to put their new belief into practice. Tenancy agreements commonly impose severe restrictions on work that can be carried out and the electrical work incidental to better artificial lighting may introduce difficulties from this aspect. Council houses suffer particularly in this respect, for their electrical installation is usually inadequate in most respects as a result of misguided cost cutting. There can be few cases of council houses in which permanent provision for lighting exceeds the one central ceiling point per room. And it is in council houses that tenancy agreements are likely to be most stringent, and to restrict effectively any attempt by the occupier to improve his lot. While the present time may be inauspicious for pressing the point, this lighting difficulty is one with the need for more socket-outlets and other electrical facilities, and must be sought at the same time.



Industrial Electronic Plant

COMMON SENSE APPROACH TO MAINTENANCE REQUIRED

By R. M. HERBERT, A.M.I.E.E.*

AT the present time, electronic equipment is being used in industry to an ever increasing extent, there being few manufacturing processes which have not benefited in some degree by its introduction.

The widespread interest in this new branch of engineering has unfortunately given the impression in some quarters that established practices can be transformed overnight, and that it will prove a panacea for many problems. It is important that this line of thought be discouraged, since electronic equipment has its own field of application, taking its place along with hydraulic, pneumatic, and other older, though equally essential, systems.

Undoubtedly, one of the most contentious matters relating to this type of equipment centres around the question of reliability, coupled with the ability of the user to provide satisfactory maintenance and service.

It is natural for works personnel to view with mixed feelings equipment employing techniques which are entirely new to them, but criticisms levelled against certain components on the grounds of unreliability, notably valves, are not confirmed in practice. The incidence of failure with this type of equipment is probably no greater than with other control gear, but due to lack of experienced personnel on site, its repercussions are more extensive.

Some manufacturers have arrangements for customers' engineers to receive a period of training, either of a general nature, or with particular emphasis on equipment about to be delivered. This scheme works very well in practice, and an increasing number of firms are taking advantage of the facilities offered.

There is a marked reluctance on the part of some manufacturers to include the electronic cubicles as an integral part of the composite machine. Too often, the unit is hung on the side of the machine, in conditions totally unsuitable to its design.

Much can be done to obtain a greater reliability in service by more extensive liaison between manufacturers on the one hand and the user on the other.

A very large proportion of industrial electronic equipment is used in conjunction with high productivity machines. Unless a fault can be speedily located and corrected, the loss in production may be considerable possibly resulting in a virtual shut-down for a particular section. Even in the most favourable circumstances, a certain time must elapse before the arrival of assistance from the manufacturers. It is essential, therefore, that the user should be in a position to carry out routine checks himself, or at least to be in a position to pass along intelligent clues to the supplier so that the maximum assistance may be offered.

It is impossible in an article of this nature to cover the servicing of electronic equipment in any detail, since this is entirely dependent upon the type of apparatus under discussion. However, there are certain well defined approaches to such problems and if these are grasped, the situation becomes considerably easier.

A breakdown usually manifests itself in one of several forms:

(*a*) The equipment is completely inoperative.
(*b*) A part of the equipment is inoperative.
(*c*) The equipment works but not as intended.
(*d*) Mal-operation of an intermittent character.

Experience proves that in (*a*) although appearing catastrophic at first sight, the trouble is usually readily identifiable. Defective operation and intermittent faults are those requiring considerable work and no little patience.

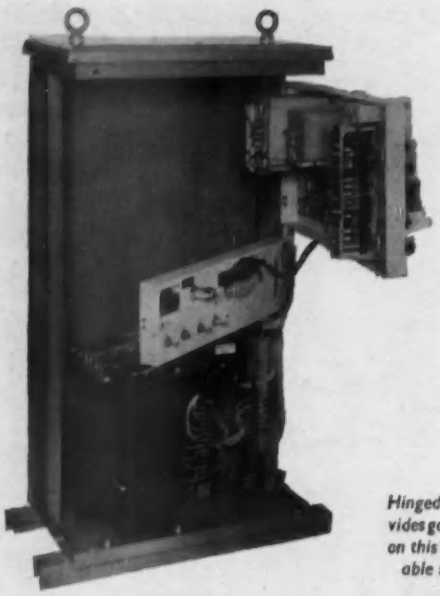
When trouble develops, two courses are open to the service engineer. He can either commence a systematic check-over, or work on a "hunch" and concentrate initially on some particular section of the gear. This latter arrangement is a time saving device providing the person concerned is already familiar with the equipment and has reason to suspect certain components. Until such knowledge is obtained, it is better to adhere to a systematic check, no assumptions of any kind being made.

It is matter for regret that in some works, the electrical maintenance personnel are disinclined to give even the most cursory inspection to electronic cubicles that are out of order. The argument seems to be that as the cubicle contains valves and other electronic components, the whole unit is beyond their ken and better left until the arrival of an expert. Such a line is defeatist in the extreme, and a moment's reflection will indicate that many failures in electronic equipment are not electronic faults at all, but due to well-known electrical troubles, as for example, dirty relay contacts and loose connections on interconnecting terminal blocks.

Very little in the way of specialised equipment is required for the servicing of electronic equipment. An oscilloscope although useful, is by no means essential for the majority of cases. There is the further consideration that it can be confusing unless you know beforehand exactly what pictures you expect to see on the screen.

*Mr Herbert is with Lancashire Dynamo Electronic Products Ltd.

The illustration above shows part of a process control installation indicating ease of removal for checking purposes



Hinged chassis provides good accessibility on this electronic variable speed cubicle

A good high resistance meter is essential, and many widely used multi-meters are unsuitable for checking voltages due to the current consumption of the instrument itself. It is for this reason that a manufacturer frequently states the type of instrument used when giving comparative figures, and if a different meter is used, then conflicting results are liable to be obtained. The reason for these discrepancies is best explained by giving an example. If a valve consumes ten milliamps and derives its supply through a 10,000 ohm resistance, then if the supply voltage is 250 V, 150 V should be read at the anode. If, however, the meter itself consumes an extra 5 milliamps, the voltage as measured will be only 100 V, a 50 V error having been introduced.

So far as tools are concerned, these should be of suitable size for dealing with electronic equipment. With the general use of miniature valves, a small soldering iron is essential if burning the insulation of surrounding wires is to be avoided.

Control equipment for multi-motor line drive. Plug-in unitised, interchangeable chassis, together with check points and good accessibility make for easy servicing

Previous Preparation

Undoubtedly, a comprehensive theoretical diagram covering a complex installation is discouraging in the extreme, including as it does, the entire electronic circuitry as well as the power and control systems. However, upon closer inspection it can be seen that in many cases, the same circuit is repeated, moreover a considerable amount of the drawing is devoted to power supplies and electrical control circuits which can frequently be treated as a separate issue. Although many service manuals include simplified circuit diagrams for servicing purposes, it is unfortunate that their use has not become more widespread.

It is most helpful for works engineers to produce their own simplified diagrams if these are not supplied, and a typical example is shown opposite. Normally, the wiring of control circuits is very difficult to follow, due to the fact that relays, their associated contacts, panel interconnections and the like are situated at widely divergent points on the circuit diagram with the connecting wires following very circuituous routes. In the diagram just referred to, it can be seen that the main procedure is to draw out the control circuits in straight lines between the main supply wires which are drawn at the left and right hand extremities of the diagram. In the event of trouble the route of any particular control wire can be seen at a glance. In the example given, the essential control circuit information from three separate drawings is available in easily assimilated form, panel interconnections being designated X5, X7, B4, etc.

Similarly, re-drawing a part of the circuit which is under consideration frequently makes its function readily identifiable. Certain essential parts of the schematic may be situated elsewhere in the diagram and if these are all grouped around their relevant circuits, with extraneous wires omitted, then the situation becomes very much easier to follow.

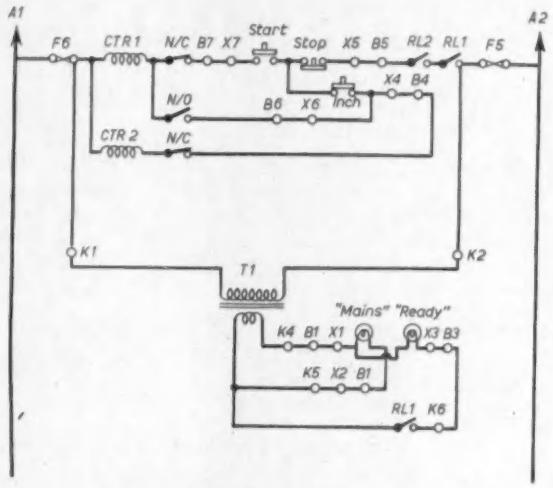
Procedure

Assuming the manufacturer has provided circuit diagrams and an instruction manual fault-finding is really a commonsense process not requiring a deep knowledge of theory.

In the event of a failure, it is by far the best plan to remove the equipment to a workshop where it can be examined in reasonable comfort on a bench with adequate lighting and other facilities. Providing that the equipment is fairly portable, the slight disadvantage of having to disconnect the wiring is entirely outweighed by the ease in which checks can be made. Having to check for faults in a confined and ill-lit space behind a cubicle where there is infrequently space to open a drawing is to be avoided if at all possible.

Having removed all covers, an initial inspection can be made without the use of any instruments, since one's own senses are able to supply a great deal of information. For example, the filaments of the majority of glass valves can be seen glowing when operating, and practice soon enables the fault-finder to differentiate by touch between a valve which has only its filaments alight and those which are passing h.t. current. Components which have become overheated generally give unmistakable indications, this applying particularly to transformers and carbon resistors.

It is always a good policy to look for the simple things first. It does not follow that because a panel consists of complicated equipment that the fault is bound to be of a



Circuit diagrams drawn out in this simplified fashion can greatly ease the task of fault finding

complex nature. Examine fuses, check that safety circuits, door interlocks, water flow switches and similar devices are operative. Check relay contacts for continuity and make sure interconnections are sound. This applies to plug and sockets and in particular the grub screws in terminal blocks.

The understandable urge to twist all pre-set controls at random should be strongly resisted. It rarely effects a cure, and means that when the original trouble is located, much time has to be expended setting up pre-set controls once more. If pre-set controls are to be moved at all, only small variations should be made, the effect being noted. Mark the original position clearly and return to this point if no improvement results.

When checking with meters, always choose a point in the circuit that admits of no ambiguity. This means when measuring between, say, earth and another point, attach the negative lead to the chassis itself, not to a wire assumed to go to earth. Similarly, when checking valve potentials, attach the negative lead to the cathode pin, on the socket, rather than the negative line, since there may be a fault between this point and the cathode.

In a comprehensive installation, some parts of the circuit may be duplicated, thus providing the opportunity to check potentials at similar points besides exchanging valve positions.

Aids Provided by Manufacturers

Realising the importance of rapid fault location, manufacturers are now going to considerable lengths to produce equipment where this end can be realised.

For ease of checking control and interlocking circuits, it is now becoming common practice to include a fault location panel consisting of a number of pilot lamps which will provide immediate indication of any trouble.

A very large number of present day industrial electronic equipment is built on the unit principle, spare units being held in store by the customer, so that these can be rapidly plugged into the circuit, the faulty unit being repaired at leisure in the electrical workshops. Where high productivity plant is being used, this is by far the most economical approach to the problem, the capital cost of the spare unit generally being paid for in the time saved at the first instance of failure. Equipment is now being built such that accessibility of all components is a major feature of construction, the accompanying photographs indicating the mechanical arrangements utilised.

The writer wishes to make acknowledgments to Lancashire Dynamo Electronic Products Ltd. for permission to reproduce the illustrations.

FAIR TRADING CHANGES

PUBLISHED last week, the sixth edition of the Electrical Fair Trading Policy shows only minor changes from its predecessors so far as discounts and rules are concerned. However, there are some interesting variations of existing definitions of the classes of purchaser covered by the policy. That of electrical contractor, for instance is amplified by reference to technical qualifications. In future, to qualify for the appropriate discounts, a contractor must "employ either as principal or operative a person or persons having served a recognised electrical apprenticeship or in possession of other technical qualifications." The electrical retailer must accept responsibility for after sale service, and the classes of special large buyer and recognised user will only qualify so far as they buy for their own use and not for resale.

Another change along the same lines is made in the section of the Policy referring to general principles. Here it is explicitly stated that it is the buying capacity of commercial and industrial buyers which provides the reason for the grant to them of discounts.

Discounts

Under schedules 2 and 3 of the Policy, which deals with electric light fittings, the discount to recognised users is reduced to two-thirds of its former level. The differential between tungsten and fluorescent lamp fittings in the street lighting category disappears as a consequence. There has been a degree of rationalisation as well as regards lighting fittings for garages. This and the other changes in discount noted below are written into the published Policy for the first time, but they have been put into effect at earlier dates.

Air-break switches and distribution fusegear has previously been dealt with in the code up to a limit of 200 amp, 600 V per way. This limit is raised in the present edition to 500 amp, 600 V.

Another reduction in the discount to recognised users is made in schedule 11 of the Policy. Finally, in schedule 12, there is a drop of over one-half in the discount allowed to special large buyers

The first edition of the Policy appeared in May 1936, as a result of a conference of trade associations having the object of "bringing together the various conflicting interests in the hope of finding some common ground on which all sections of the industry could unite for discussing in an amiable spirit their outstanding differences, and formulating a *modus vivendi*." The present edition includes an historical introduction to the development of the Electrical Fair Trading Council as a new feature. Other main sections cover the general principles of the Fair Trading Policy, classifications and definitions, recommendations and notes on various types of electrical product. The new edition of the Policy is priced at 2s. Copies may be obtained from the Electrical Fair Trading Council, Sardinia House, Sardinia St, London, W.C.2.

PROGRESS AND PROSPECTS

Inaugural Address to the I.E.E. by Sir George H. Nelson, Bt.

THIS year's President of the I.E.E., Sir George H. Nelson, Bt., delivered his inaugural address to the Institution in London last Thursday. The theme of his address was "the great prospects and the responsibilities of electrical engineers in contributing in the future to the benefit of man everywhere." He began by giving the early history of the Institution citing the prophetic words of Charles William Siemens in his address to the first meeting, in which the extension of the then Society of Telegraph Engineers to embrace all the fields of electricity was envisaged. On the history of the electrical industry Sir George emphasised the tremendous increase in size of set, and in the generating capacity of the U.K. and the U.S. which had taken place in the past 50 years. The increase in efficiency had brought about a steady fall in the cost of electric power in comparison with the cost of living over the past 30 years amounting to more than 45% in this country and 50% in the U.S. The advances in the design of electrical equipment had come from great imagination, courage and enormous expenditure on research and development by the heavy electrical manufacturing industry financed almost entirely from its own resources.

Development

These developments had resulted in a reduction in rotor weight from 1·0 ton/MVA to 0·2 ton/MVA despite an increase in set size of more than 20 times. Similarly iron losses in transformers had been reduced to one-quarter of their value 30 years ago. Progress had been most significant also in the fields of switchgear and high voltage transmission up to 400 kV.

The application of electrical and electronic control in many important industries was increasing both production and quality in a most spectacular manner. Thirty years ago, sheet steel was produced from steam-driven mills in small sheets at a rate of about 2·5 m.p.h. Today, sheet steel of much more accurate dimensions was produced in coil lengths of 15 miles, leaving the rolls at a rate of nearly 60 m.p.h. Time and efficiency could be gained by the use of electronic computing machines in the solution of research and design problems.

The Standard of Living

From his extensive travels overseas, and from discussions with those carrying the highest responsibility in the many countries, Sir George had found an almost unanimous determination of all nations to improve their standard of living, and they all realised that the key to this lay in the greater application of electric power to the source of their national economy, including agriculture, communications and industry. To the electrical engineering profession and industry this brought increased responsibility. It had been estimated that by the year 2050 the world's population would have reached a total of 6,000 million. At the recent Geneva Atomic Energy Conference, Prof. Robinson and Dr Daniel had said that by 2000 the world consumption of energy would be not less than the equivalent of energy of 7,500 million tons of coal per year, representing a three-fold increase in energy consumption over the next 50 years. These prospects compelled a solution of the problems which would arise from the steady exhaustion of conventional fuels and basic materials. The progress made by scientists, technologists and engineers had been such that at the appropriate moment, almost by a miracle, nuclear power had become available to meet the needs of mankind.

Should the standard of living of the world have been raised to that of the United States or Great Britain, it had been estimated that the resources of basic materials—iron and copper and others—would have been exhausted in 25 years. Progress did not take place at this rate, yet nevertheless the problem might well be acute in 100 years time. This was a very short period, in normal times, in which to solve problems of such immense and fundamental character as producing artificial substitutes or making basic metals in quantity by transmutation or the synthesis of a heavy element into a lighter one. Prominent in this field, however, were the cellulose products. The possibilities of this material could be assessed by realising that the energy which reached the earth from the sun every day had been estimated as being as least 5,000 times the total energy produced from all man-made engines in the world today, and this energy provided the basis of cellulose.

In the realm of artificial fibres, Terylene had physical properties akin to steel which indicated that in time materials might be produced as a direct substitute. Similarly synthetic materials could now be used for pipes thus replacing copper and lead.

The Future

The latest discoveries of the scientists and technicians might well make the risk of war so terrible that man might not face the consequence of the total annihilation of his species. Should this be so, it would be possible to release a considerable number of scientists, technologists and engineers from the study of the destruction of man in order to play a part in the improvement of world conditions. Even so the demand for electro-technical scientists and technologists would continue. The Institution was to be congratulated on producing, with industry, the film "The Inquiring Mind." It was particularly important to attract into the electrical industry a great proportion of the young people who still chose the Arts at various levels. Further interest could be stimulated by increasing the number of well-qualified teachers in mathematics and science subjects in secondary schools. It was also important that technical colleges not affected by the Minister's recent announcement of the upgrading of certain technical colleges to university standard, should not be lowered in standards or facilities. In fact there should be an extension rather than a curtailment. There was great scope for the "careers" masters at schools who could assess a boy's potential development and they should be given facilities to push forward boys of technical ability. It was on these organisations and people that the industrialist of the future would have to depend.

In his visits to centres and sub-centres of the Institution, said Sir George, questions had been raised about the need for more papers on the management and practice of research, manufacture and operation of electrical machinery, and he sincerely hoped that the Council and Papers Committee would take note of this and that members who could present such papers would respond to this very important request and so add to the continuous improvement in production and operation of electrical equipment.

Licensing for Electricians *in Australia*

ALL GRADES OF WIRING WORK INVOLVED

by A. DEARDEN*

THERE has always been a lot of discussion about compulsory licensing for electricians in Great Britain; some are for, some are against. Having had experience of licensed electricians in Australia, where it is compulsory by law to hold a licence before being able to carry out any electrical wiring work, and also in South Africa, the writer, while not against compulsory licensing, is convinced that it presents many loopholes. Judging wiring practice in Great Britain, he has found as good a job done, if not better, by a skilled electrician in Great Britain than in countries where a licence is compulsory.

It must be admitted that in Australia there is not the same amount of work carried out by the handyman, as is found in Great Britain. Although a certain amount is done by unauthorised persons, compulsory licensing of electricians does certainly curb the activities of the handyman. If an unlicensed man is found carrying out wiring, etc., a severe penalty is imposed. The authorities at present are trying to make it compulsory for firms carrying out repairs to appliances to hold an appropriate licence, as the question of dangers involved in the faulty repairs to electrical appliances is only too well known. It does not necessarily follow, of course, that in these countries where a licence is required that there are no accidents, as a number occur from time to time from careless work. So it does not necessarily mean that a customer is getting a safe job done because the electrician holds a licence.

State Rules

The rules and regulations appertaining to electricians procuring a licence in Australia may be of interest. In Queensland, New South Wales and Victoria, each State has its own licensing rules. To begin with, Queensland only has one licence for electricians, and so has New South Wales, but the State of Victoria has four different grades of licence, "A," "B1," "B" and "C."

An "A" grade licence authorises the holder to engage in and supervise all classes of electrical wiring work. A "B1" grade licence authorises the holder to engage in all classes of electrical wiring work under the supervision of the holder of an "A" grade licence, and to supervise the installation of electrical wiring where the pressure of supply does not exceed 250 V. A "B" grade licence permits the holder to engage in all classes of electrical wiring work under the supervision of the holder of an "A" grade licence, and to carry out electrical wiring work, where the pressure of supply does not exceed 250 V under the supervision of the holder of a "B1" grade licence. A "C" grade licence entitles the holder to engage in electrical wiring work under the continuous supervision of the holder of an "A," "B1" or "B" grade licence, but only while in the employment of an employer whose name is stated on the licence.

An "A" grade licence may be issued to any person over the age of 21 years who:

(*a*) has been engaged in electrical wiring work for a period of at least seven years and has passed the examination or examinations prescribed by the Commission under these Regulations.

(*b*) has a certificate or certificates issued by or under the authority of the Victoria educational body that he has successfully completed a course or passed an examination.

(*c*) holds a Certificate of Trade Competency granted on completion of a five-years' electrician's trade course.

A "B" grade licence may be issued to any person over the age of 21 years who has at least five years' experience in electrical wiring work and has passed the written and practical examinations conducted by the Commission.

A "B1" grade licence may be issued to any person over the age of 21 years who is qualified to receive a "B" grade licence and who has obtained at least 75% of the possible marks in both the Commission's "B1" grade written and "B" grade practical examinations.

A "C" grade licence may be issued to any person under the age of 21 years who is employed as an apprentice by any person to engage in electrical wiring work under the direction and continuous personal supervision of a holder of an "A," "B1" or "B" grade licence.

For the issue of "A," "B1" and "B" grade licences, the Commission may accept the passing of examinations, which, in its opinion, prove at least an equivalent degree of technical knowledge and manual skill, in lieu of its own examinations.

In the case of applicants who hold Diplomas in Electrical Engineering, or who have passed the appropriate sections of the Electrical Trades Course laid down by the Apprenticeship Commission, the requisite period of experience in electrical wiring work is reduced to three years for a "B1" grade or "B" grade licence and to five years for an "A" grade licence.

It is interesting to note that "electrical wiring work" is defined as "actual physical work of installing an electrical installation or the supervision of such work." In assessing the period of experience of an applicant, some recognition may be given to practical electrical work, other than electrical wiring work, in cases where the applicant for a "B1" grade licence has had at least two years' experience in electrical wiring work, or where the applicant for an "A" grade licence has had a minimum of three years' experience in electrical wiring work.

In order to meet special circumstances, the Commission may issue permits corresponding with the above grades of licences, but with limitations as to time, place, class of work and conditions of employment.

Exempting Qualifications

In N.S.W. and Queensland, where only one licence is issued, licences may be issued without examination to any person: (*a*) holding a University Degree or the equivalent; (*b*) Corporate membership of the Electrical Engineering Branch of the Institution of Engineers (Australia); (*c*) the certificate of competency in the electrical trade issued by certain technical colleges, and a five years' apprenticeship to the electrical trade; (*d*) a licence to contract for or carry out electrical wiring work issued in another State or territory of the Commonwealth or in another country. Every such applicant is, however, additionally required to satisfy the Electrical Contractors' and Electricians'

* Mr Dearden has recently returned to this country after some years' work in Australia.

Licensing Committee that he has had sufficient experience in electrical wiring work and that he is of good character, otherwise his application will not succeed.

The above regulations can make it quite difficult for qualified electricians emigrating to Australia who, when they sit for the examination may not be quite familiar with the theory questions, but are otherwise good tradesmen, therefore, they fail on the theory but pass with full marks on the practical examination, and one must remember a man may be competing with an apprentice coming out of his time, whose memory is still fresh on the theory side.

Cases exist where a good electrician has failed on one or two theory questions, and therefore, before he was allowed to sit for another examination, he may have to wait another six months. In the meanwhile, he may have to take up other employment to keep him going, which can be most aggravating.

In Queensland an interim certificate is granted, provided the qualifications to start work are possessed. This certificate is granted so that a man can get acquainted with the rules and regulations. After three months of satisfactory work, a report from the employer may obtain him a licence, otherwise he will be required to sit for an examination.

Electrical contractors in New South Wales also must hold a licence independent to the electricians' licence, and many electricians in the past have had the impression, that if they pass the examination, and obtain an electrician's licence, they will be able to set up as contractors. Actually, a licensed electrician is not eligible to apply for an electrical contractor's licence until he is able to furnish evidence to the satisfaction of the committee of having been employed on electrical wiring work as a licensed electrician for a period of at least 2 years within the preceding three years.

In some States cable-jointers, linesmen and electrical fitters are required to hold a licence referring to their particular trade.

The above-mentioned examination, both theory and practical, is much about the same in each State. The theory consists of wiring rules and regulations, Ohm's law and its application to resistance in series and in parallel, conductance, volt, ampere, ohm. Definition of power, power developed in a circuit, watt, kilo-watt, horsepower, work and energy, watt-hour, kilo-watt hour, relation between electrical units, electrical instruments, two, three and four wire circuits, and d.c. and a.c. installations, standard wire gauge, size of wire and cables commonly used in electric wiring. Operating principles of motors and general use. Transformers, testing and locating of faults, etc., etc. Practical test includes switchboard wiring and lighting circuits, etc.

Lighting and the Citizen

OPENING the 1955/56 session of the Illuminating Engineering Society on Tuesday, the new President, A. G. Higgins, M.SC., F.R.I.C., F.I.E.S., Barrister-at-Law, chose as the theme of his Address the impact of the Society on the citizen, an impact which manifested itself in a multiplicity of ways since the Society was concerned with all aspects of lighting. Initially, of course, the greater part of people's working life is spent under natural lighting, which has been given considerable attention by the Society, as shown in Part III of the latest edition of their Code. But it is in the field of artificial lighting that the citizen has been bestowed with a wealth of benefits and this subject formed the major part of Mr Higgins' Address.

In the home, however, few of these benefits have been applied, resulting in the unsatisfactory position that, in the lower income groups particularly, the quantity of artificial light employed is, in general, well below the standards recommended by the Society. Although it then becomes obvious that more education is needed in this direction, this is by no means the only solution since many modern developments are not available to the large number of people living in houses owned by local authorities who, for economy, supply only the bare essentials of lighting. Usually, the only provision comprises a lighting point in the centre of the ceiling of each room together with an outlet on a skirting board, the latter all too frequently being monopolised by radio or television. If, moreover, the tenant wishes to provide himself with better lighting he is faced with considerable capital outlay which he is reluctant to undertake on property which is not his own, provided, of course, that, as a tenant, he is not precluded from channelling the walls to provide additional outlets.

Industrial Developments

Industrially, the position is considerably better, the advantages of modern light sources having been exploited to a marked degree. In this sphere the Society, having provided a platform for many excellent papers on the lighting of factories, has played a notable part. Although there are still many factories where the lighting is still of a lower order than the Society deems desirable there are now thousands of workers enjoying a high standard of lighting. Curiously, where industrial workers are, to some extent, catered for by Statutory Instruments and Regulations, no such provision has yet been made to ensure adequate lighting in offices, although it seems likely that the Government intends to introduce legislation relating to conditions of employment in various non-industrial occupations which will no doubt include lighting.

Lighting for Leisure Time

Lighting has also played a substantial part in enabling leisure hours to be more profitably employed, notably in entertainment and sport, whilst in the lighting of schools and streets the Society has also taken active interest and present-day standards, although leaving room for improvement, are markedly higher than those considered to be suitable for our forebears.

In this work the Society has established a responsibility to continue and increase its contribution to the public well-being, but it may be necessary for the Society to cast its net wider and bring into its deliberations and discussions more people who, although not illuminating engineers, are closely associated with lighting. It may even be considered that its present title is not altogether appropriate, although it must continue to give careful attention to the training of lighting engineers and to the designation or qualifications awarded against a certain standard of professional ability. Possibly the Society's first attempt to satisfy its members' professional requirements does not entirely meet the case, but whatever the qualification, and its status which industry ultimately accepts, they would like to see that all employers of lighting engineers do all in their power to encourage their staffs to acquire the qualification, assist them in their training, and to recognise the qualification as an essential requisite for those engaged in lighting practice.

READERS' VIEWS

Correspondents writing under a pseudonym are asked to submit their names in confidence to the Editor

I.E.E. Statutory Regulations

I READ with interest "Megohm's" comments of the statutory regulations of the 13th edition of the I.E.E. Regulations for the electrical equipment of buildings (your issue of 29th September, 1955), giving the electricity boards more power—and it is certainly about time! Regarding the inspection of the installation of a previously-used house, it is the practice of some area boards to disconnect the supply as soon as the old occupier has left; therefore the new occupier has had to have the installation tested before the supply can be restored. It is not always convenient to do this, but when one does eventually gain admittance, what a lot of unauthorised additions one finds on such installations, and this apart from the deterioration due to age of many installations. Of course, most of the unauthorised editions are carried out by the "handyman" in a dangerous manner.

Many of the new occupiers need quite a lot of convincing before they realise installations are so dangerous. One is greeted by such remarks as: "Well the other people seemed to have no troubles," etc.

My advice, to intending purchasers of these previously used houses, is to have a competent electrician to give the installation a good inspection before they decide to buy, as some house agents give very little consideration to the electrical installation. It is possible for them to tell the new occupier that everything is in order, even if the house were wired in wet string.

Arthur Dearden,
MANCHESTER 2.

Storage Heaters

I WAS pleased to read the article on electric space heating by means of thermal storage heaters by Mr F. D. Parker, and noted with interest the various points raised. During the past 25 years I have made a special study of space heating by electrical apparatus and although during that time steady and persistent progress has been made in the design, efficiency and finish of equipment put forward, I do not consider there has been a development so significant and revolutionary as that which will follow the introduction of the thermal storage space heater.

The various types of heaters used for "on-peak" heating have disadvantages which militate against their general acceptance, and emphasise their limitations; but in the right conditions the thermal storage space heater meets a need as near perfectly as any apparatus can. The quality of the heating, the design of the equipment, the appearance of it and the control of it, all are attractive and desirable.

When these heaters first came to my notice, in order to satisfy myself about their capabilities and characteristics, I carried out a series of tests, each one of which exceeded my expectations, and in the various installations which I have designed the results have been entirely satisfactory. To give one example, I was approached by the chairman and secretary of a concern whose offices are contained within a one-storey building, soundly constructed but standing on rising ground close to the Fens, an area that in wintertime is cold and bleak.

I found on investigation that the ceilings of these offices were insulated and that the general thermal qualities of the building were satisfactory. During the very coldest weather of last winter, often more than 20° of frost, these offices were maintained at a comfortable temperature with the result that our clients are completely satisfied.

With reference to temperature control in buildings heated by thermal storage heaters, I find that satisfactory results can be obtained by having an indoor thermostat only, fixed between 2 ft 6 in. and 3 ft above floor level and placed in the coldest part of the building and set by thermometer test to 65° F. In one case we have an installation where the control is by QA/QR thermostats and this appears to be satisfactory although there was one day when no heat was available because the previous night had been warmer than usual with the result that the thermostat did not close. Unfortunately the day following was cooler and some discomfort was experienced.

Concerning the building mentioned in the article by Mr Parker, on reading the details I notice that the heaters were switched on at 8 p.m. and off at 7 a.m. This is longer than usual and may be due to the fact that either the thermal qualities of the building are poor or the quantity of heat is insufficient. I am not suggesting this is so, but this is the reaction I had upon reading the information.

I would emphasise that the views expressed above are purely personal.

L. Houldridge,
EASTERN ELECTRICITY BOARD.

Small Appliances on H.P.

I AM very perturbed at the fact that our local Electricity Board hire purchase such trivial current-consuming appliances as electric clocks.

Recently after negotiating with a customer to purchase a Smith's Electric Clock at about £2. 2s., he came to me and told me that he had arranged to hire purchase this from the Electricity Board over a 2-year period.

I can quite understand current-consuming appliances such as cookers, water heaters, etc., being carried on hire purchase by Electricity Boards, but cannot for one moment understand an item of this nature with its negligible wattage rating. Surely for anybody to hire purchase items of this nature is contrary to the Government's economic policy.

Wiring Contractor.

Car Battery Deteriation

I HAVE read with interest the replies to "Motorist," 25th August issue, "Readers' Views," and as I feel you will be closing the correspondence on this subject very soon, I would like to sum up the remarks with a few hints.

May I say that sulphation is a rare occurrence in a battery which is periodically topped-up with pure distilled water. Tap water, no matter how pure it may appear to be, should at all times be disregarded, as should rain water from a water butt or static tank. Pure distilled water is cheap and can be easily obtained.

There is no doubt in my mind that the real problem lies not only in the composition and formation of the plates—positive and negative—but more so in the composition and design of the separator, as described by Mr R. L. Walker.

May I respectfully ask Mr D. H. Gibson (Bristol 7) to tell Cardiff motorists and battery users to use only pure distilled water for "topping-up" battery purposes. Although this water, though analysed at one time may be suitable, its composition may change at some later date and in this way render it unsatisfactory for use in batteries.

J. H. Robinson,
THORNTON, FIFE.

Fault Impedance and the Time Factor

T. C. GILBERT, M.I.E.E., states the case for voltage operated protection

IN the 13th Edition of the I.E.E. Wiring Regulations, earthing requirements, together with their associated section on testing, are very comprehensive, and the two sections comprise the greatest changes compared with the previous edition. Basic requirements are such that with the occurrence of an earth fault of negligible impedance from a phase conductor to adjacent metal, the resulting fault current must correspond to three times the circuit fuse rating or one and a half times the setting of the overload circuit-breaker. There can hardly again be cause for complaint as to the inadequacy of check or test of earth continuity conductor, or loop, impedance, although the maximum of 25 amp testing current seems little enough for 30 amp circuits, now common in domestic installations for ring and cooker circuits. So far as the writer is aware, no loop tester at present on the market can deliver more than 20 amp, at unstated voltages, but no doubt the revised requirements for testing will have considerable bearing on the design of testing equipment yet to come.

Time Factor

Satisfactory as the new testing requirements are, the writer remains in doubt as to whether we have yet got right down to reality; have we yet got the picture complete, or are there pieces of the jigsaw yet to fall into place? For instance, one looks in vain for any consideration of, or guidance on, the time factor, the vital one in any consideration of danger from fire or shock. It is true that the Regulations say, No. 6, "every circuit shall be protected against the persistence of earth leakage currents liable to cause danger," but how long is "persistent"? In the case of fuse links, B.S.88 provides for links that can carry 60% overload for 30 minutes, but 30 seconds may be fatal in the event of contact with a live conductor; the position seems to be even more difficult where h.r.c. fuses are used, with which effective breaking capacity militates against overload protection. As has been pointed out in Home Office publications in this connection, examination of the characteristics of h.r.c. fuses shows that some makes, rated at 300 amp, will carry 400-500 amp for 30 minutes, and up to 750 amp for one minute. In any circuit requiring, say, 250 amp full load current another 200 amp of leakage current could persist for 30 minutes in any 230/400 V circuit with an earth loop impedance of no more than 1·1 ohms. It is true that attention would probably be

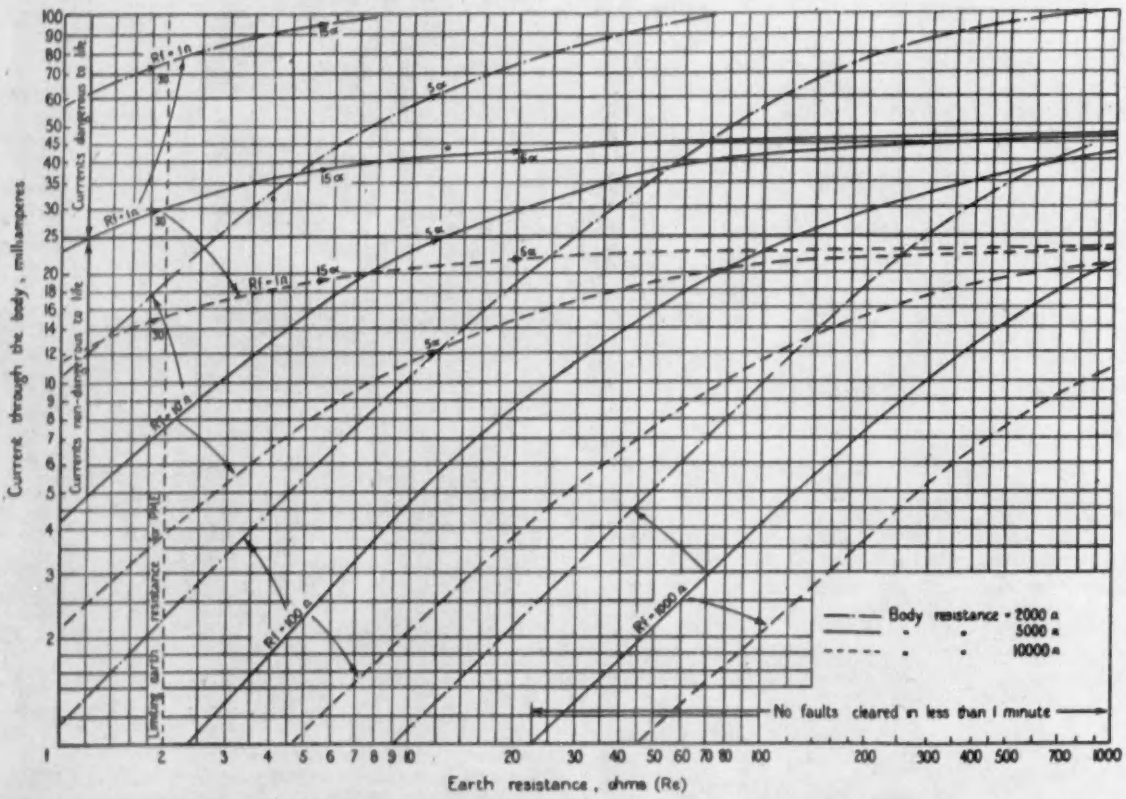

Current through the body, milliamperes
Currents dangerous to life
Currents non-dangerous to life
Limiting earth resistance for 30 mA
Rf = 1Ω
Rf = 500 Ω
Body resistance = 2000 Ω
5000 Ω
10000 Ω
No faults cleared in less than 1 minute
Earth resistance, ohms (Re)

Fig. 1. Approximate currents passing through the body with varying fault, earth and body resistances, on 230 V supply. The arrows indicate the resistance of the electrode which would permit various sizes of fuse to blow in less than one minute at fault resistances corresponding with the curve

drawn to the fault by voltage drop or other indication, but by then the fire may have started.

The point is rather emphasised by Regulation No. 406, wording—"a fault of negligible impedance," but unfortunately many earth faults originate in windings or at some point in heating elements, and under these conditions the fault current must be restricted by the impedance of the section of winding or element remaining in circuit. This implies that the time required for isolation of the faults indefinitely extended, and both leakage current and, more important, possible contact voltage are rendered persistent. It is often said that fault impedance is such an elusive factor, and so entirely unpredictable, that any

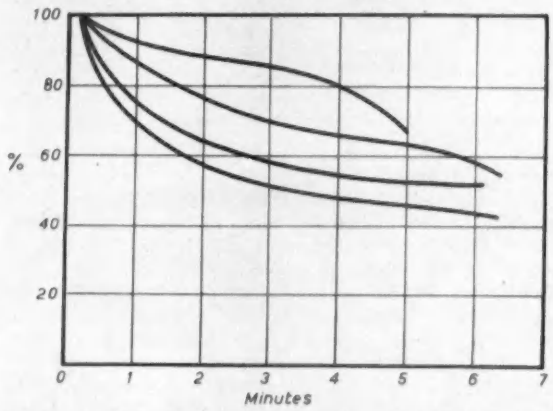


Fig. 2. Reduction of body resistance with continuing current flow. A serious reduction can be seen to occur within the first minute

attempt to evaluate it cannot be anything more than intelligent guesswork with all methods of leakage protection dependent upon current flow. This is to ignore the valuable work that has been done in this country and abroad regarding the implications of fault impedance, and the level of danger set up with varying values; at home, there is a readily-available E.R.A. Report, Ref. F/T122, "Safety of Consumers in Rural Areas; Second Report," but as this was published in 1940 the writer feels that it has not received the close attention that it so clearly deserves, due to the incidence of more pressing happenings at that time.

Fault Resistance

Although we now speak of "impedance" in connection with earthing problems the word "resistance" will be used here to prevent confusion with the wording of one or two extracts from this Report. Obviously, the effect of resistance in any fault between current-carrying parts of an appliance and its metal framework must be to prevent or delay the blowing of the circuit fuse. Under these conditions if contact is made with the metal work by a person at the same time in contact with any earthed object, or standing on a conducting floor, a current will flow through the body which may be sufficient to produce a dangerous shock. To quote the Report:

"If the supply is at 230 V, the fault resistance Rf, the resistance to earth of the appliance Re, and the resistance through the body to the general mass of the earth R, the current through the body is given by

$$i = \frac{230 \times 10^3}{\frac{RR_f + R + R_f}{R_e}} \text{ Milliamps}"$$

Using this formula the compilers of the Report have produced the curves shown in Fig. 1, in which various values of "i" have been calculated for various values of

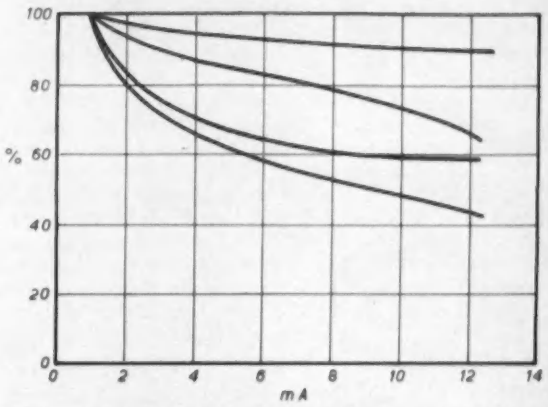


Fig. 3. Illustrating the reduction of body resistance with increasing current passing

R, R_e and R_f, assuming fault resistances of 1, 10, 100 and 1,000 ohms, showing the current through the body with body resistance of 2,000, 5,000 and 10,000 ohms. The results have been plotted logarithmically in order to show up more clearly the lower values of earth resistance which are of particular importance with systems of protective multiple earthing, with which the Report was particularly concerned. The horizontal line at 25 milliamp purports to show the approximate distinction between currents which are dangerous to life and those which may be considered as not so dangerous. An as example of the use of the curves, take the case where the earth resistance of the appliance is 20 ohms and the body resistance 5,000 ohms; under these conditions the current through the body is 8·6 milliamp when the fault resistance is 100 ohms and 43 milliamp when it is 1 ohm, the former probably innocuous but the latter most likely lethal.

The writer would not readily agree that these resistances for fault and body are typical, but assuming that they are a case is definitely made out for the isolation of the fault when its resistance is 100 ohms, without waiting for it to fall to 1 ohm as a result of burning or charring of insulation, that is, turning a small leakage into a phase-to-earth or phase-phase short circuit. With the immediate isolation of an incipient fault, danger may be averted; delay will almost certainly lead to risk of accident. In the curves shown in Fig. 1 arrows have been inserted to indicate the resistances of the electrodes which will permit various sizes of fuse to blow in less than one minute at the fault resistance corresponding with the curve; from this it will be seen that a 5 amp fuse would blow with a fault resistance of 1 ohm but the possibility of receiving a 43 milliamp shock might persist for nearly a minute, a very dangerous condition. On the other hand, the 5 amp fuse would not blow with a fault resistance of 100 ohms, and the possibility of receiving the 8·6 milliamp shock would persist indefinitely. There are, of course, all the other possibilities for danger with fault resistance falling between 1 and 100 ohms.

It will also be noted from Fig. 1 that in circuits rated at 15 amp fuses will not blow if the fault resistance is greater than 4·7 ohms, and at this value the currents that can flow through the body are 34 milliamp at 2,000 ohms body resistance, 13·7 milliamp at 5,000 ohms, and 6·9 milliamp at 10,000 ohms. The rate of energy dissipation in the 4·7 ohm fault with, say, 30 amp flowing—and the fusing current of a rewireable fuse can hardly be less than 2½ times the rating—is over 4 kW, so although the shock risk may be low the fire risk is acute; even with 100 ohms fault resistance the energy dissipation is 0·5 kW. not outside

the danger range. In a circuit protected by a 30 amp fuse, and with which we are concerned in domestic installations, the fuse will not blow under the conditions visualised unless the fault resistance is less than 1 ohm.

The position is summed up in the Report as follows:

"As the earth resistance increases the shock risk increases. Increase of fault resistance decreases the current through the body, but at the same time makes it less likely that the fuse will blow. The net effect of fault resistance, therefore—other factors remaining constant—is to decrease the value of current through the body, but increase (possibly indefinitely), the time for which the possibility of shock may exist. If the resistance of the earth electrode exceeds 22 ohms the smallest standard fuse will not be blown in 1 minute even if the fault resistance is zero."

Shock and Fire Factors

Although the curves in Fig. 1 afford a great deal of valuable information in connection with shock risk and the relationship of fault, body and earth resistances, and is, so far as the writer is aware, the only attempt to evaluate the risks under varying conditions, some of the assumptions made must be called into question. For instance, the value generally accepted to-day as representing a dangerous current is that at which the victim is unable to release himself from the live contact, and for most people this appears to be about 15 milliamp. It is suggested, therefore, that a more realistic picture would be afforded with the horizontal line drawn at 15 rather than 25 milliamp. Body resistances, too, seem to be taken at too high a value, a point suggested in the Report itself, as a person seated in a bath—a situation in which, unfortunately a large number of fatal accidents occur—would represent a very low resistance to earth, probably not more than a few hundred ohms; the value of 2,000 ohms should therefore, in the writer's opinion, be considered as a maximum and not a minimum for calculations of this kind. If these points be conceded it will be found that the risk of dangerous shock with varying fault, earth and body resistances, using the formula quoted above, will be very much greater than the curves indicate. For instance, taking the common case of a person seated in a bath, representing a resistance to earth of 120 ohms (an actually measured figure), a loop resistance on the house earthing system of 2 ohms, more than 35 milliamp can flow through this body even with 100 ohms fault resistance. It is within the bounds of possibility that such a fault resistance might be represented by current passing over dampness deposited on a short-path insulator in, say, a radiator used in the bathroom; in other words, the accident might occur even with no fault on the appliance.

Rapid Fuse Rupturing Vital

To bring the curves in Fig. 1 up to date the electrode resistances must be ignored and loop impedances substituted, and this will certainly result in increased values under all earthing conditions, again emphasising the risk of shock, which increases in company. In the writer's view, this aspect would apply especially to systems using protective multiple earthing shown to the left of the vertical line in Fig. 1, and in connection with which the assumption of resistances not in excess of 2 ohms is optimistic, to say the least. However, probably the most serious argument that can be brought to bear in connection with these investigations is an objection to the tacit acceptance of times up to one minute as permissible for the blowing of fuses; in all cases of shock it is the first minute that counts, as during this period the body resistance can fall considerably, resulting in greater current through the body.

This is exemplified in the curves shewn in Figs. 2 and 3, taken from a report on body resistances prepared by Continental investigators a few years ago, and which shew quite clearly that if danger from shock is to be eliminated isolation of the fault must take place well within a minute—in a matter of seconds, in fact. The decrease in body resistance is cumulative with both time and increase in current flow, with the two apparently inseparable. Whatever the original current through the victim's body at the time of first contact it is only necessary to leave him connected to the source of shock and within a few seconds it may have increased fourfold. The explanation is the rapid production of perspiration, and the tightening grip due to current increase, resulting in a great reduction in contact resistance; probably the actual resistance through the body remains unchanged, but the component of contact resistance is what undergoes the rapid change.

Real Cause of Danger

Valuable as is the information contained in the report quoted and as given in Fig. 1, the writer considers that it would have been even more so had the shock risk been related to the *voltage* appearing upon the earthed appliance casing, the earth continuity conductor and all other sound metal frameworks connected to it upon the occurrence of persistent leakage due to fault resistance. This would enable us to visualise the danger more clearly, especially the possibility of low-voltage contacts for cattle and horses, whose body resistances, neck-feet, forefeet-hindfeet, are often well below 500 ohms, depending upon the form and area of contact. The writer does not wish to complicate the matter unduly, but in all cases of non-isolation by fuses the menace of voltage gradients at both local and pole-transformer earths exists, and there is no need to emphasise the risks. However, the information available does indicate that protection from fire or shock sets up antagonistic requirements, the elimination of one is liable to set up the other, and that this condition exists both with ordinary earthing methods and with protective multiple earthing; if anything, the fire risk is greater with the latter.

Consideration of the above and other factors leads the writer to doubt if it will ever be possible to completely solve the earth-leakage protective problems with any method depending upon current flow operating overload devices, and that concentration upon voltage-operated methods would show better dividends, both as regards efficiency and economy. Running round in circles may give the impression of activity but it is hardly progress; the mere fact that fault impedance has negligible effect with all forms of voltage-operated protection, and that the time for operation is set at 0·1 second under conditions where isolation becomes necessary should certainly lead us to consider which way we should go. At present such methods are merely alternatives to be used when the apparently simpler direct earthing methods cannot be relied on; the writer has tried to show that they cannot be relied on under probably 50% of times when they are urgently required to protect from fire and shock. The new regulation requirements and the experiences of factory inspectors and others show beyond all doubt that it is the *persistent* leakage that is the real cause of danger; fault impedance will ensure persistence in many cases and thus introduce the lethal time factor.

The writer acknowledges permission to use extracts and the diagram in Fig. 1 from the ERA Report Ref. F/T122—"The Safety of Consumers in Rural Areas; Second Report."

around the trade

by Peregrin

ELECTRICAL contractors should be slightly mollified by the recognition of apprenticeship in the new Fair Trading Policy definition, but the old loop-holes are still there. The purpose of the definition is not to enable one electrical contractor to recognise another one. It is for the guidance of suppliers when confronted with an aspirant to "trade terms," and a "business at any price" supplier could easily create the applicant an electrical contractor on the spot, by acknowledging "suitable" premises, "necessary" equipment, or especially "other equivalent qualifications," thus conveniently short-circuiting the new apprenticeship safeguard. So I am afraid E.C.A. members will still complain that membership of the F.T.P. Club is still not very exclusive. Fortunately, reputable wholesalers, such as E.W.F. members, know how to separate the sheep from the goats, and do so efficiently, and the others have probably never heard of the F.T.P. anyhow.

The "After-sales" service now required of electrical retailers is sensible and logical. I believe the R.T.R.A. have long insisted on that qualification in their members. Most electrical retailers already comply, but it will be interesting to see if the chain stores now begin to offer the service most of them lack, for "accepting responsibility for after-sales service" should mean more than just packing the offending appliance and passing it on to the manufacturer for attention.

Dreams of fair trading are, however, quickly dispelled when we are reminded of our old friends the Special Large Buyer and the Recognised User. The former, by stretching a point here and there, may grudgingly be deemed worthy of trade terms, but the latter class includes practically every other manufacturer in the country, and new members are being enrolled every day.

Interference Misunderstanding

In spite of all the publicity, or perhaps because there was too much of it, when the regulations governing radio interference were introduced, there seems to be a good deal of confusion about the scope of them. Customers protest that every new appliance likely to cause interference must be on sale already suppressed, while some retailers take a similar attitude towards manufacturers and wholesalers, even hinting that unsuppressed and thus obsolete stock is being disposed of illegally. This is not so, of course. The makers are not yet obliged to embody suppressing devices in their products, nor is the retailer breaking the law by selling existing stock. The customer may insist, if he likes, on a suppressor being fitted, but an extra charge can be made for the service.

Much misunderstanding also exists with regard to appliances already in service. Many users think they are breaking the law by using a machine that causes interference, and some believe they ought not to own one even, whether they use it or not. I have heard of cases where nervous householders take care only to use the sewing machine or the hair dryer while TV is off the air, and they must be finding that rather difficult now that we are blessed with lavish entertainment from noon to midnight.

It would be a good service to the public in general to clear up the situation, but as usual, it is nobody's job to do it. The B.B.C. cannot be expected to offer comfort to the unsuppressed, for naturally they are heavily on the side of any measure or movement towards reducing interference. There is good business for retailers in fitting suppressing devices, and it will last for a long time, but the wise ones will confine their sales efforts to persuasion, and not talk too much about compulsion.

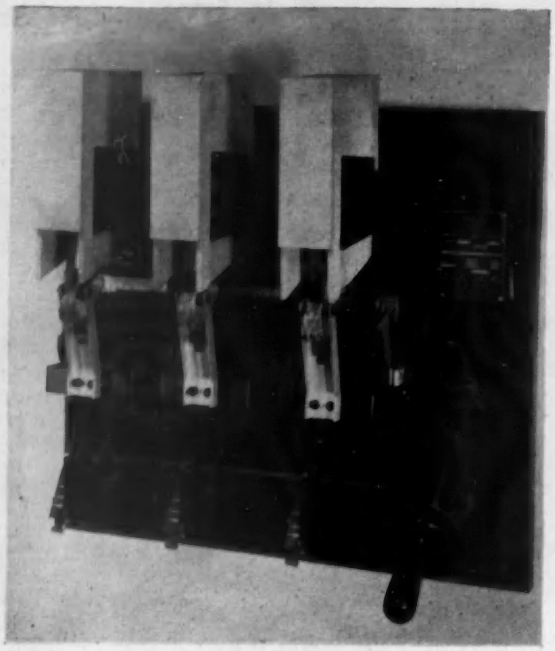
Shop Hours

Once upon a time the person who governed shop hours and most things relating to retail shops was the customer. Proprietors, managers and assistants fawned on him and combined to seek his favour. Times have changed. During all the recent discussions in conference and Press about early closing and shop assistants' holidays, scarcely a passing though has been spared for the customer and his convenience. He has been kept waiting on the mat while his fate is decided. It seems there is a scarcity of assistants but no lack of customers. Well, none of us wants to return to the bad old days when shops kept open till 8 p.m. during the week, and 10 p.m. on Saturdays, but shops exist to serve, and there are few enough shopping hours already, especially for those who are at work all day.

How does the electrical trade feel about this perplexing choice of closing on Saturday or Wednesday afternoon, or all day Monday, or not bothering to open at all? As I see it, an electrical retailer, and any other good shopkeeper, is in business with two objects, to provide a service and to make a profit. The two should be complementary, but in these prosperous times there is a deplorable tendency to feel that if the profit can be made reasonably easy, the service need not be particularly good. Fortunately, most electrical traders have resisted this tendency.

The ordinary electrical retailer is in a dilemma. He has not enough assistants to let them have a week-day off, and he cannot afford to close for a whole day, nor would his customers let him. Even if he were compelled to close, unless he removed himself from the premises all day, they would find him, either at the back door or by telephone, and his closing day would be as much of a holiday as the contractors' Saturday morning. The small electrical retailer is, therefore, resigned to making do with one half-day a week, and rarely is it Saturday afternoon. One has only to glance into an electrical shop in an industrial town on Saturday to understand that. One retailer friend assured me that he sells as much on a Saturday as during all the rest of the week, because, as he put it, employees of manufacturers and wholesalers and other lucky five-day weekers, all go shop-gazing with their wives.

In justice to electrical traders it is doubtful if they covet more holiday or early closing. They are a hardworking class, keen on their job and mindful of their obligation to the public. Many of them, and I speak from experience, would not know how to employ leisure if they had it, never having been accustomed to it.



Redesign of a

MODIFICATIONS

By G. W. BUCKLE,* A.M.I.E.E.

AN additional range of air-break circuit-breakers has recently been introduced by the General Electric Co. The units in this range have been developed by Salford Electrical Instruments Ltd. and incorporate important modifications. In particular, the "V" groove and wedge-shaped blade used in the original range have been discontinued, and an alternative design adopted. This has enabled the Company to produce a circuit-breaker of equivalent performance at a relatively lower price (Fig. 1).

Blade and Contact Design

The original and the new type of circuit-breaker are illustrated in Figs. 5 and 6 respectively. In the original type each blade carried a total load of 28 lb and was designed to take a current of 125 amp. The effective load was doubled by the wedging action of the 60° angle faces, so that the pressure per inch line of contact was 14 lb. The horizontal steel thrust bar "D" served to locate the blades "A" and imparted an upward motion to them during the last few degrees of movement. This upward motion also served as a check that the pressure between the blades and main contacts "E" was correct, since under normal conditions the motion was within the range 0·070 to 0·090 in. (1·75 to 2·25 mm). Fig. 7 shows the relationship between total voltage drop and blade contact pressure with the original type of circuit-breaker.

Tests carried out in developing a new circuit-breaker showed that a flat-faced blade in contact with a flat copper block would give a satisfactorily low voltage drop at the contact surface with low watt dissipation (and, hence, low temperature rise) at pressures comparable with those used in the old type of circuit-breaker. Fig. 8 shows the relationship between the total voltage drop from block to block and the blade contact pressure, under these conditions with a current of 125 amp. It will be seen that with a 28 lb load on the blade the voltage drop for a design of this kind is about 14 MV, as compared with 8 MV for an equivalent load in the older type of circuit-breaker (see Fig. 7). The amount of watts to be dissipated has increased, therefore, by approximately 75%. With a current of 125 amp flowing in the blade the resulting temperature rise at the normal rating of the circuit-breaker still lies within the limits specified in B.S.S. 862/1939.

Further tests were carried out to ascertain the temperature rises that would be obtained in a pair of blocks with blades loaded at 28 lb and carrying currents of 100, 125 and 150 amp respectively. The dotted curves shown in Fig. 4 were obtained as a result of these tests.

A 200-amp circuit-breaker was then built, based on the flat-faced blade design. The temperature rise obtained when the blades were subjected to various current loadings were then ascertained, the standard 28 lb loading being maintained throughout the tests. As can be seen in Fig. 4, the results were similar to those obtained with the blade and blocks in the original tests. The variation observed is believed to be due to the larger masses of metal used in the contacting arrangement; the greatest divergence between the original test and the 200-amp production circuit-breaker occurred with a 150-amp loading on each blade and it is believed that under these conditions a greater proportion of current is shunted round the auxiliary sparking circuit, so that there is less temperature rise in the blades. A temperature rise curve for one of the old V-groove 200-amp circuit-breaker is included in Fig 4, as a comparison.

Similar tests were next carried out on a 1,600-amp circuit-breaker incorporating blades of the new design and these results, too, are shown in Fig. 4. It will be seen that at this level the temperature rise is considerably higher than in the corresponding test, because of the reduced ventilation and the smaller mass of metal available for heat dissipation. A temperature rise curve for an older type V-groove 1,600-amp circuit-breaker has been included for comparison.

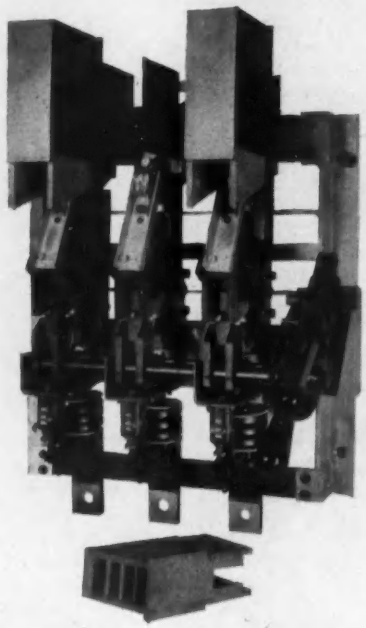
Following these tests, the Company set about developing a new circuit-breaker which would incorporate a flat-faced blade in contact with a flat copper block. The result can be seen in Fig. 6. The horizontal thrust bar "D" and the hook-shaped blade retaining plates "C" were redesigned into more easily produced shapes with slightly better movement. A tendency for the blades "A" to slip sideways, and hence collapse when the circuit-breaker was closed, was overcome by a simple form of blade guide affixed to the bottom block "E." This guide takes the form of a comb "F" with the teeth between the blades proving an effective remedy against sideslip.

Intermediate and Final Sparking Contacts

To simplify manufacturing technique it was decided that all the new circuit-breakers would be fitted with a magnetic blow-out type of arc-quenching device incorporating intermediate and final arcing contacts. (In this type of circuit-breaker the main contacts are short circuited successively by the intermediate sparking contacts and the final arcing contacts opening in that order; this obviates any possibility of damage from arcing at and to the main contacts).

The resistance of the two parallel paths had to be kept as low as possible to ensure that during the period of opening and current transfer through the parallel paths, there would be no tendency for a voltage build-up across the rapidly opening gaps with consequent secondary arc-

*Mr Buckle is with Salford Electrical Instruments Ltd.



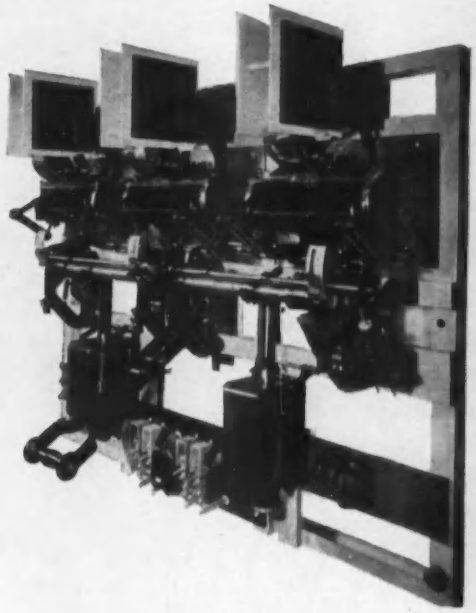


Fig. 1. On the left page is a general view of the redesigned circuit-breaker. On the left (Fig. 2) is a view of a 400 A T.P. breaker arranged for frame mounting and a breaker (right, Fig. 8) designed for nominal rating of 5,000 amps per pole for a continental mill

Line Contact Circuit-Breaker

TO REDUCE SIZE AND INCREASE CURRENT CARRYING CAPACITY

ing. Accordingly the new circuit-breaker was designed so that there would always be continuous paths of adequate section, assisted at moving contacting parts by flexible braids. Dissimilar metals were chosen for the final arcing contacts to assist in final rupture.

In order to reduce the chance of failure when the circuit-breaker opens on a heavy fault current, interturn insulation was introduced between the turns of the coil producing the flux for the magnetic blow-out. Both the intermediate sparking contacts and the final arcing contacts are adjustable separately.

The final arc quenching is now through an arc chute incorporating arc splitters of a special porcelain, resistant to the highest temperature which can be developed by heavy arcs when the circuit-breaker opens on heavy fault currents. This special porcelain arc chute, which also has extremely high electrical resistance, was developed in conjunction with the Parkhall Pottery Ltd., Longton.

Experiments are also proceeding with one of the newer casting resins, Ethoxylene, with a view to producing arc chutes in this material heavily loaded with asbestos or silica powder.

The free-handle closing mechanism was also redesigned and now includes a device which locks the contacts in the open position and precludes any possibility of their rebounding when the breaker opens on fault current.

Whilst it is appreciated that circuit conditions determine the rupturing capacity of a circuit-breaker, the new range has been designed to meet the more general and hence

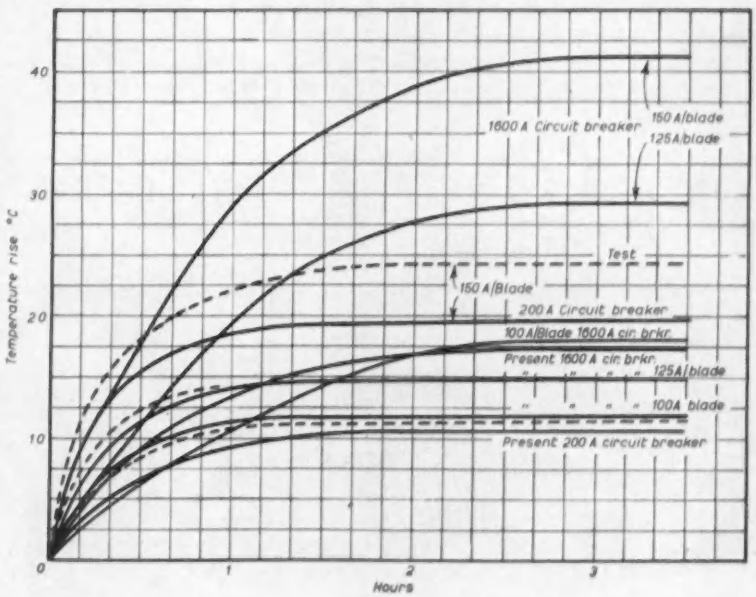


Fig. 4. These curves indicate the performance of various ratings of circuit-breakers

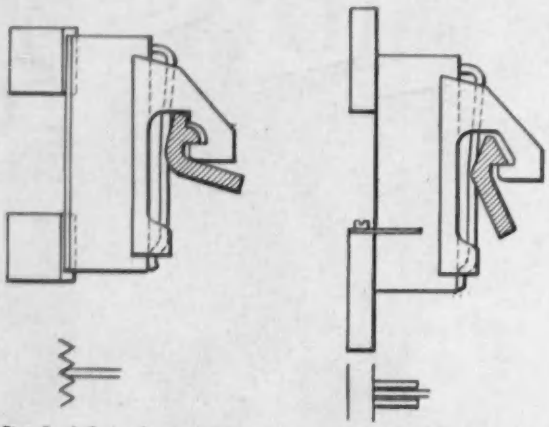
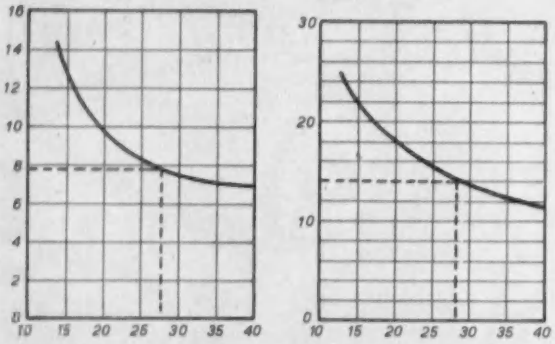


Fig. 5. Left is shown the original arrangement of the line contact circuit-breaker. The principal modifications are illustrated in the right hand drawing Fig. 6



The millivolt drop is plotted as ordinate against lbs weight as abscissa in these curves. Left is the original circuit-breaker (Fig. 7) and right is the curve of the new circuit-breaker (Fig. 8)

the greater market requirements. No rupturing capacity figures are specified in the present edition of B.S.S. 862/1939, so that the circuit-breakers have been designed so that, for circuits up to 1,600 amp normal rating, they have a rupturing capacity of at least 7·5 MVA when tested in accordance with the conditions laid down in B.S.S. 116 where such conditions can be found to be applicable.

Dimensions and Mountings

By careful design it was found possible to remove all bearings from between the poles and mount these upon the actual current carrying parts, thereby enabling the distance between the pole centres to be reduced with a corresponding reduction in the width of the circuit-breaker. As examples of this reduction the following can be quoted for actual dimensions over the poles and mechanism. (The measurements given below do not include any mounting panel, etc., so allowance must be made for clearance between live parts and the width of the mounting frames).

(*a*) 400-amp triple-pole circuit-breaker reduced from 20½ in. to 15 in.

(*b*) 1,600-amp triple-pole circuit-breaker reduced from 23 in. to 17½ in.

In this country it is the normal practice for air-break circuit-breakers of this pattern to be mounted upon panels of asbestos-based material or of slate. The majority of continental manufacturers have, however, discarded this method in favour of mounting upon metallic structures using synthetic resin bonded materials, e.g. Permali or porcelain in the small number of places where insulation is required. The design of the modified line contact circuit-breaker lends itself particularly to this kind of mounting and the company have introduced for this purpose a welded steel angle framework which will be popular not only on the continent but in this country, particularly for back-of-board mounting and for use in sheet metal cubicles. Such a circuit-breaker (Fig. 2) was built and appeared for the first time at this year's Utrecht Fair, whilst circuit-breakers mounted in the conventional manner made their debut at the A.S.E.E. Exhibition (Fig. 1).

Though at present the standard range of the new circuit-breakers only extends up to 1,600 amp per pole, a circuit-breaker with a nominal rating of 5,000 amp per pole has been built to the new design. Mounted on an angle iron steel frame with insulation only where required, it has been installed on a 3-phase 380 V, 50 c/s system in a continental mill. Closure and opening of this circuit-breaker, which is shown in Fig. 3, are accomplished by solenoid operation, using a rectified d.c. supply.

Heavy Plant in Europe

THE eighth review of large power plant has now been produced by the Organisation for European Economic Co-operation. This covers the member countries Germany, Austria, Belgium, Denmark, France, Italy, Norway, Netherlands, Sweden, Switzerland and the U.K.

In the range 10 to 39·9 MW deliveries of alternators were 2,441 MW compared with 2,539 MW forecast. This is attributed to arrears encountered in consignments abroad and to non-member countries. However, the total of orders in hand for delivery during the subsequent four years increased from 5,314 MW to 5,902 MW. Orders for delivery to member countries increased from 2,899 MW to 3,775 MW while those for abroad and export decreased from 2,415 MW to 2,127 MW. Forecasts for deliveries to be effected during 1955/6 (April/March) were 2,821 MW, a substantial increase over last year's figure.

The larger range of alternators 40 MW and upwards, deliveries made during the period attained the all-time record of 4,410 MW. Order books covering the next four years have increased to 13,668 MW, and shipments for 1955 call for the delivery of 6,016 MW, a rise of more than 33% over last year.

A similar situation developed for steam turbines; the target in the range 10—39·9 MW was not reached, as out of 2,818 MW scheduled for delivery, 132 MW remained to be delivered, and in the larger sizes, the level of deliveries was 3,989 MW, some 1,491 MW higher than in 1953. Overall order books totalled 12,913 MW.

With respect to boilers, the survey remarks that in 1951 orders for medium-sized boilers represented six times the steaming capacity of large-size boilers. In 1954/5 the orders for the latter considerably exceeded those for the medium sizes. Deliveries of hydraulic turbines and alternators fell below expectations during the year although order books are fairly full.

An unusual feature was a fall in transformer shipments and for the first time order books for the next four years show a distinct fall in requirements.

Data on the largest units now conceived in Europe show, says the survey, a remarkable advance on performances of only one year ago, both for alternators and for the mechanical parts of installations. This applies not only to the rating of the units, but also to the specifications concerning the maximum temperatures and pressures. The largest turbines in course of construction in the member countries were: Germany, 250 MW, 4,300 lb/sq in. 1200° F; Switzerland, 150 MW, 2,450 lb/sq in. 977° F; France and Italy, 125 MW, 1,800 lb/sq in., 1000° F; Great Britain, 120 MW, 1,200 lb/sq in., 1050° F; and Sweden, 110 MW, 1,400 lb/sq in., 970° F.

CONTROL GEAR—

on the "build it yourself" principle

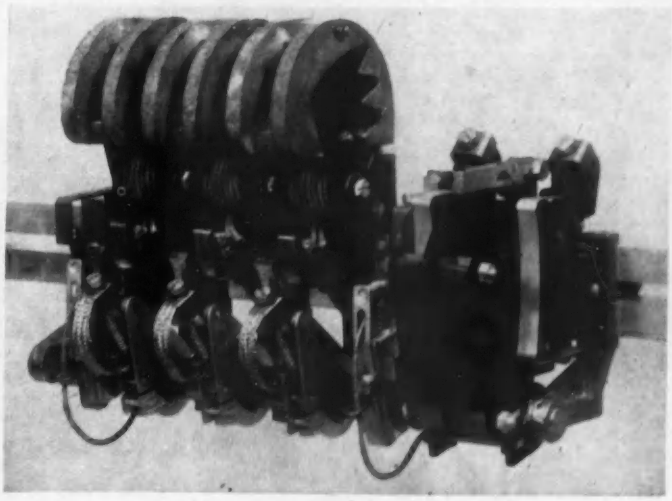
ONE of the difficulties faced by an electrical exporter, particularly in the switch and control gear field, is that the labour available for erection or replacement of equipment on site may not possess the skill and experience demanded by the nature of the work. Although the provision of suitable instruction manuals can expedite erection, any move towards simplification of the work involved is of greater benefit in reducing both the chances of error and time expended. To this end, the Electric Construction Co., Ltd., have made a considerable step forward with a new range of heavy duty contactor gear in which the simple principle of the "Meccano" system has been carried forward to the extent of making users' construction of motor control gear a distinct possibility.

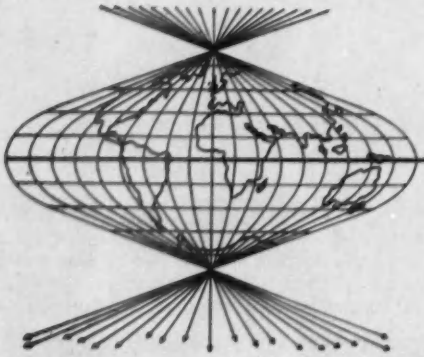
Introduced at a trade show in London last week, the new range of switchgear—from 50 A to 750 A a.c. or 1,000 A d.c. ratings—is designed to reduce to a minimum both the time of building control units and the stock of components which has to be carried for replacement purposes. The gear is built up on the unit assembly principle throughout, employing at the start, a metal framework to which special cross members are bolted. Both cross members and fixing arrangements are identical regardless of the size of contactor gear to be mounted on them. The cross members carry the fixed contact assemblies and contactor coil together with the arms which hold the rotating bar on which the moving contacts are mounted.

In assembling a three-pole contactor unit, for example, the first stage is the construction of the moving contact assembly. This assembly is mounted on a square section, steel bars having a cylindrical bearing at each end and insulated over that part of its length which carries the contacts. The armature of the coil is first positioned and clamped on the uncovered part of the bar, using a simple jig to ensure correct positioning. In a similar manner, the moving contacts of both the main contactor and its auxiliary switch are positioned and clamped, a single bolt only securing each part. The completed moving assembly is then secured on the frame by inserting each end in an arm bolted to the cross member. Each fixed contact assembly and the fixed section of the coil magnetic circuit is then bolted to the cross member, the design of both the assembly and the cross member ensuring automatic self alignment. The coil is held in position merely by two spring clips which bear on the end cheeks. A quick acting release enables the complete moving assembly to be lowered for access.

Offered with the new range is a variety of ancillary fittings, which include isolators arranged for interlocking, h.r.c. fuse mounting and magnetic overload trips of the dash pot type. Also available is a sealed pneumatic timing device of the diaphragm pattern which can be arranged for delays from 0·5 sec to 30 sec and thus covers virtually all starting characteristics. Normally, the contactor units are supplied built up into complete starter units, which, offered in the standard range of direct-on, star/delta, rotor/stator, auto-transformer and similar units, are replacing the firm's existing starters. It is stated, however, that customers can purchase separate poles, auxiliary switches and the like to assemble into any required combination whilst these units are eminently suitable for assembly into customers' equipment.

Details of the 100 A contactor can be clearly seen below, with arc chutes raised to show contacts. Above is shown a standard star/delta starter employing two such units together with a diaphragm timer





OVERSEAS NEWS

A SUMMARY OF IMPORTANT EVENTS

CANADA

Saskatchewan's Progress

An increase of 19·5% in output of all power stations of the Saskatchewan Power Corporation last year is a good indication of the tremendous electrical developments taking place in that Province. The annual report of the Commission for 1954, while noting the inauguration of a 25 MW set at Saskatoon and a 20 MW extension at Estevan, reports that a further 33 MW machine has been ordered for the former station and a 30 MW unit for Estevan. The new Swift Current power station is also due to operate shortly. At the end of Dec. the Commission was serving 111,000 consumers, many of whom have been connected under the farm electrification programme. Last year's work under the scheme was handicapped by an excessive rainfall in the spring and summer. Nevertheless, over 5,000 miles of single-phase line were erected, in addition to 292 miles of 72 kV line and 315 miles of 25 kV line. The Commission's eastern transmission system also suffered severely in a storm which felled a portion of the 72 kV line from Estevan to Yorkton causing interruptions of up to 20 hours duration.

Transformer Order

Ferranti Ltd. have received a further order from the Aluminium Co. of Canada Ltd. for three 71,000 kVA single-phase generator transformers stepping up to 301,400 V. These units will form the second 213,000 kVA bank of generator transformers to be supplied by Ferranti Ltd., for installation in the power station of the Alcan project at Kemano, British Columbia. The transformers are unusual in that they will have aluminium windings, and it is believed that they will form the largest bank of transformers with aluminium windings in the world. This order brings the total number of transformers supplied or under construction by Ferranti Ltd. for the Alcan project to 13 units of a total capacity of 648,000 kVA.

Future Load Survey

A major study of the resources, economy and industry of the province of Alberta with the aim of projecting the directions and rapidity of the province's economic development, is being undertaken for Calgary Power Ltd. by J. T. Donald Co., Ltd., a Montreal firm of consultants. The investigation is scheduled for completion within 18 months. Calgary Power Ltd., sponsors to the report, supplies about two-thirds of the electric power used in the province of Alberta.

JAMAICA

Investigation

An investigation concerning the electricity supply system in Jamaica is to be carried out, with particular reference to what has been termed "the antiquated 40 cycle system." The Government proposes to set a Commission to investigate the question of conversion. The sum of £10,000 has been allocated for the survey work and for preparing proposed new laws governing electrical installations, we understand. The local supply undertaking around Kingston, Jamaica, which is operated by the Jamaica Public Service Co., Ltd., has both 40 cycle and 60 cycle systems.

U.S.A.

Synthetic Mica

The work which has been going on for some time in the United States aimed at producing a satisfactory form of synthetic mica, to which we have already referred, is to be stepped up. The U.S. Office of Defence Mobilisation has announced that it has authorised the General Services Administration, which buys strategic metals and minerals for the national stockpile, "to enter into research and development contracts for materials and processes to replace natural mica in strategic critical applications." In its announcement, the O.D.M. said the need for the research programme arose out of the shortage of natural mica, the supply of which was "insufficient to provide for mobilisation requirements." Natural mica was the only satisfactory material which could be used in the manufacture of certain strategic electronic products, the office explained. The G.S.A. has programmes to buy both domestic and imported mica. The buying programmes for mica have never been officially revealed because they are considered a defence secret, but officials have admitted that they "have not been fulfilled." The new research programme was agreed to by O.D.M. after it had reviewed a report of the Office of Minerals Mobilisation of the Interior Department which had recommended a five-day research and development programme to be undertaken partly by the Federal Government and partly by industry with financial assistance from the Government. The O.D.M. said the programme would consist of an expansion of the Government's programme of basic research on synthetic mica, and applied research by industry dealing mainly with improvements in synthetic mica.

EUROPE

Nuclear Proposal

Austria's electric power authorities are planning to build a small nuclear power station on the banks of the Danube.

Extending the Underground

An ambitious scheme providing for extensions and construction of new lines for Madrid's underground railway system is the subject of a decree law issued recently. Under this the Ministry of Public Works is empowered to construct over 40 miles of new line, involving 30 miles of tunnelling. The work will take over 15 years to complete, and the cost is estimated at over 3,000 million pesos. With the inadequacy of the municipal transport system, expansion of the Madrid underground system has been anticipated for some time. But there has been criticism of the financial side of the undertaking, it being asserted that the present fares do not cover running expenses and depreciation. This additional network is likely to throw a further burden on the undertaking, it seems, unless fares are increased.

EGYPT

Aswan Dam Scheme

Sir Alexander Gibb and Partners have been retained as consulting engineers for the High Aswan Dam project by the Egyptian Government under a preliminary agreement recently signed. The project is expected to cost over £200 millions, of which about 45% will have to be found in foreign capital. A combined irrigation and power scheme, the electrical output in the first stage, has been put at around 2,000 million units per annum. But before any further progress can be made agreement with the

Sudan is necessary on the use of the Nile waters, for the construction of the proposed 330 ft high dam would flood substantial portions of Sudanese territory. Dr Selim, as secretary-general of Egypt's National Production Council, has said that the Egyptian Government had offered to divide the surplus Nile waters with the Sudan on a 50-50 basis. He also added that an international body of consultants would be retained as a "higher body" than Sir Alexander Gibb and Partners, in order to obtain all available experience.

INDIA

West Bengal Scheme

Work on the scheme to supply electricity to the rural areas of West Bengal to encourage small-scale and cottage industries and thus expand employment possibilities is said to be progressing satisfactorily. Under the scheme 60 places spread throughout the 14 districts are to get electricity by the end of the current financial year. The cost of the scheme—Rs. 1·63 crores—will be borne by the Government of India.

AUSTRALIA

Seeking Lower Charges

Alleging that overseas markets were dwindling because high power rates kept production costs high, the New South Wales Flour Millers' Association have approached the Sydney County Council seeking a reduction in electricity charges. A member of the Association has said that power costs were more than 30% of the Sydney Mills' processing costs. He said many export markets had already been lost, and any reduction in flour exports would intensify Australia's wheat surplus and aggravate the storage position.

Any Power Wanted

Australia would be struggling for years before the demand for electric power was overtaken, in the opinion of Sir William Hudson, Commissioner of the Snowy Mountains Hydro-Electric Authority. This was due to two factors, he said. Australia's rapidly rising population, and an increase in production which would more than double the amount of power used by each worker in the country. They would need every kilowatt of power they could get, whether it be from coal or hydro-electricity, and when nuclear energy was available they would need that too, he emphasised.

NEW ZEALAND

Geothermal Investigations

At least 200 MW of electric power could be obtained from the whole thermal steam area around Wairakei, New Zealand, in the opinion of scientists and engineers of the Department of Scientific and Industrial Research. This information is given in a bulletin just compiled by Dr L. I. Grange, Director of Geological Survey, which reviews the history and progress of investigations. In this it is stated that at Wairakei 30 bore holes have been sunk to depths from 574 ft to 3,200 ft; half of these are regarded as development wells and the remainder as primarily exploratory. Two of the deeper 8 in. bores have a combined output of over 17,000 kW. Detailed measurements of heat rising from hot pools, springs, etc., give a total power potential of about 250 MW, but as it was unlikely that areas capable of yielding under 10 MW would be brought into production, the total could be reduced to 200 MW. As the latter figure is based on heat flow at the surface it was apparent that at least that amount would be obtained on drilling, but how much more could be tapped was not known, he added. Generally the bore discharges are of 25% steam and 75% water. The bulletin includes reports of the individual geologists engaged on the investigations since 1949.

Safeguarding

It was costing the supply authorities of New Zealand thousands of pounds a year to look after the interests of one New Zealand cable-making company and two subsidiaries, said Mr R. H. Bartley, at a meeting of the Auckland Electric Power Board recently. To give two Dominion companies a monopoly of certain sizes of transformers and condensers was also costing boards a very large sum. In both instances there is a virtual prohibition on imports, he said. A remit asking the Board of Trade to take action on both classes of equipment is to be sent to the N.Z. Supply Authorities' Association conference. The board is also to seek the Association's support for Government action to discourage, or if necessary control, uniform tendering.

Saving many hours of labour, a complete prefabricated 250 ft chimney stack was erected in one piece at the Liverpool power station of the Electricity Commission of New South Wales last month. The chimney weighing 51 tons, was erected by 12 men in 55 minutes. The chimney is made of steel, and is in five 50 ft long sections. Instead of building up the stack piece by piece, as is the usual practice, the prefabricated sections were laid in a cradle on rollers (enabling them to be turned round) and welded together on the site. The chimney has an internal diameter of 7½ ft, the conical bottom section broadening to a diameter of 10½ ft. To erect the stack, 120 ft high masts were placed on either side of the concrete foundations, and the steel cylinder was guyed to the top of those masts from a point a little above the centre of gravity of the cylinder. After swinging the chimney vertically a few inches above its foundations, eight pairs of heavy bolts were placed in position, the chimney then lowered, and the bolts made firm to a concrete slab supported on piles. Steel guy ropes from points 150 ft and 250 ft above the base were then fixed. The new chimney stack will serve all four boilers of the 25 MW Liverpool "package" power station, the plant for which has been supplied to the Commission by Westinghouse Electric International Co. Three sets have been in operation for some months past

Personalities

IN THE INDUSTRY

Due back today, 13 Oct., from a two-week study of rural electrification in Russia, are **Mr C. A. Cameron Brown,** B.SC., M.I.E.E., agricultural electrification adviser to the C.E.A., and **Mr J. Gogan,** M.I.E.E., M.S.M.A., chief commercial officer, South of Scotland Electricity Board. They were included in the Working Party of the United Nations Economic Commission for Europe, which visited a number of installations in Russia at the invitation of the Ministry of Agriculture, as part of the exchange of technical information. The same Working Party is to visit Austria in Nov.

Station superintendent at Pontypridd power station, South Wales Division, C.E.A., since 1948, **Mr I. Gowan** has retired after 45 years' service in the Industry. Mr Gowan's retirement coincided with the closing down of the power station, in which he spent the whole of his working life.

The end of this year will bring the retirement of **Sir Joseph Hallsworth,** M.A., LL.D., from the chairmanship of the North Western Electricity Board, on completion of his term of office. His successor in that post, as from 1 Jan., 1956, is to be **Mr T. E. Daniel,** M.ENG., M.I.E.E., A.M.I.MECH.E., who has been the Board's deputy chairman since Sept., 1953. Sir Joseph Hallsworth has been chairman of the North Western Board since May, 1949, and in the last two years served as one of the Area Board chairmen on the Central Authority. Earlier he was a member of the National Coal Board and chairman of the Miners' Welfare Commission. He was for many years general secretary of the Union of Shop Distributive and Allied Workers. Prior to joining the N. Western Board, Mr T. E. Daniel had been deputy chairman of the North Eastern Electricity Board for five years, for he gained much of his extensive experience with undertakings on the North East coast. He was borough electrical engineer at Darlington from 1937 to 1948, after four years in a similar capacity at Ashton-under-Lyne. Educated at Wallasey grammar school and Liverpool University, he gained early experience in the Industry with the North Metropolitan Electric Power Supply Co., and with the Battersea Borough Council's undertaking.

The re-appointment for a further two years of **Mr W. S. Lewis,** C.B.E., J.P., COMP.I.E.E., as chairman of the Midlands Electricity Board, and of **Mr J. Mould,** O.B.E., A.M.I.E.E., as deputy chairman of the East Midlands Electricity Board, is also announced. Both have held those offices since the formation of the respective Boards eight years ago.

With the acquisition by the Midland Electric Manufacturing Co., Ltd., of J. H. Tucker and Co., Ltd. (noted on page 572), **Mr J. B. Tucker,** chairman and managing director of the latter concern, has agreed to remain on the board of the firm until the end of this year to assist in the transition, and **Mr J. C. H. Tucker** has been appointed general manager with a seat on the new board of J. H. Tucker and Co., Ltd.

Mr J. E. Gaffney, late works manager with J. H. Tucker and Co., Ltd., has now left their employment, we learn. His private address is 25 Ashhurst Rd, Walmley, Sutton Coldfield.

The Council of the Illuminating Engineering Society has announced the following awards in connection with papers presented to the Society for the past year. The Leon Gaster Memorial Premium goes to **Dr W. E. Harper** and **Mr A. G. Palmer** for their paper entitled "Lighting of Hazardous and Corrosive Locations in Industrial Plants." Dr Harper is with the Plastics Division, Imperial Chemical Industries Ltd., and Mr Palmer is with the North Thames Gas Board. The Silver Jubilee Commemoration Award goes to **Mr K. R. Ackerman** for his contributions to lighting design and brightness patterns. Mr Ackerman was formerly with the British Thomson-Houston Co., Ltd., and is now with the British Broadcasting Corporation.

Mr D. J. Bolton, M.SC.(ENG.), M.I.E.E., whose retirement from the Commercial Department of the Central Electricity Authority we reported on 25 Aug., is going to Venezuela for Kennedy and Donkin, consulting engineers, to report on the electricity tariffs to the Caracas undertaking. He expects to be away for about six weeks.

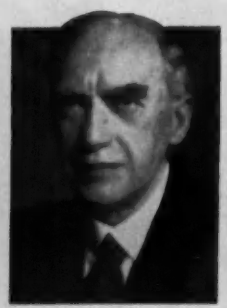
Sir Ernest Smith, C.B.E., has accepted an invitation to continue in office as President of the National Smoke Abatement Society for a further year, in view of the death of the president-elect, Lord Horder.

Two new directors of Lumenated Ceilings Ltd. are announced. **Mr I. D. Cameron,** who has joined the board as technical director was previously technical manager, a position he has held since the company's inception last year. **Mr Donald McCullough** is the other newcomer to the board.

At the first meeting of the Illuminating Engineering Society for the 1955-56 session which took place on Tuesday, **Mr A. G. Higgins,** M.SC., F.R.I.C., F.I.E.S., Barrister-at-Law, took office as President. Mr Higgins was educated at Dulwich College and London University and studied law at the Middle Temple. He held a number of positions with the former South Metropolitan Gas Co., including that of outdoor lighting superintendent; he is now assistant secretary of the Institution of Gas Engineers.

Gent and Co. Ltd. have appointed **Mr C. G. Coulton** as the company's Birmingham manager. Mr Coulton who

Mr T. E. Daniel



Sir Joseph Hallsworth

Mr W. S. Lewis

Mr J. Mould

Mr C. G. Coulton

Mr R. H. Church

Mr T. B. Parker

Mr C. P. Holder

Mr H. I. Wood

Mr H. C. Spence

has been with the company for 28 years gained experience in the works prior to being transferred to the commercial side of the business and in 1947 joined the estimating staff. Prior to the present appointment he had been a Midlands area representative for the past two years.

Dr D. H. Black has been appointed Principal Director of Electronics Research and Development, Ministry of Supply, in succession to **Mr F. S. Barton,** C.B.E., M.A., B.SC., F.INST.P., M.I.E.E., F.INST.R.E. (U.S.A.), who has been appointed Adviser, Defence Supplies, M.o.S.

The end of November will bring the retirement of **Mr H. C. Spence,** M.I.E.E., M.I.MECH.E., from the position of deputy chief engineer to the London Electricity Board, after 43 years' service in the Supply Industry. Mr Spence received his early training with the Dundee Corporation undertaking, and subsequently held appointments as assistant engineer with the Glasgow Corporation Electricity Department and the Yorkshire Electric Power Co. In 1929 he was appointed engineer and manager of the Holmfirth U.D.C. undertaking, holding that position till 1933 when he joined the Croydon Corporation as distribution engineer. There he was promoted in 1937 to deputy chief engineer and general manager, and in Oct. 1946, was appointed to succeed Mr Norman Elliott as chief engineer and manager of the Wimbledon Corporation undertaking. Mr Spence became assistant chief engineer with the L.E.B. in 1948.

Mr R. W. S. Mitchell has been appointed group chief engineer of Associated British Engineering Ltd. Mr Mitchell will be responsible for the coordinating of the technical activities of the six member companies of the group and advising the Board on its technical policy. He has been chief development engineer of the Diesel Engine Division of the English Electric Co. since 1950.

Appointed as area sales manager for Scotland for Thorn Electrical Industries Ltd., is **Mr R. H. Church** who is well known in the lighting industry, having served with the Philips organisation from 1929 to 1939. During the post-war period, Mr Church formed his own company and was responsible for the design and manufacture of decorative and commercial fluorescent lighting fittings including fluorescent units for fast moving fighting vehicles, a large number of which are now in use.

Chief rubber technologist for Johnson and Phillips Ltd., **Mr T. B. Parker,** has retired after 54 years service with the company. His successor is **Mr W. S. Penn,** B.SC., as we have already announced. Mr Parker is one of the leading rubber technologists in the Cable Industry and for a great many years played an important part in the preparation of C.M.A. Specifications, and served on a number of technical committees. He also gave considerable assistance to the Service Departments, particularly the Admiralty, and to the mining industry in the design of special cables.

The Metropolitan-Vickers Electrical Co., Ltd., announces that **Mr E. M. Johnson,** M.SC.(TECH.), M.I.E.E., has relinquished his position as chief engineer, Plant Department, on being appointed consultant to the chief electrical engineer of the company, and **Mr C. P. Holder,** B.A., M.I.E.E., has been appointed chief engineer, Large Electrical Machine Department. In addition, **Mr H. I. Wood,** B.SC., A.M.I.E.E., is now assistant chief engineer, Turbo-Generator Engineering Department. Mr Holder took his degree at Queen's College, Cambridge, and went to M.-V. as a college apprentice in 1931. On completing his course he joined General Engineering Department, and in 1936 transferred to the company's Plant Engineering Department, since when he has specialised in the design of salient pole a.c. machines. In conjunction with Mr E. M. Johnson he has read two important papers on that subject before the I.E.E.—on "The design of large vertical-shaft water-turbine driven a.c. generators" (1948) and "The design of high-speed salient pole a.c. generators for water power plants" (1952). Mr Wood was educated at Kirkwall Grammar School and the Royal Technical College, Glasgow. He joined M.-V. as a vacation apprentice in 1929. After obtaining his degree from Glasgow University and completing his apprenticeship at Trafford Park he joined the company's Motor Engineering Department in 1934. Three years later he transferred to Plant Engineering Department, where he has been concerned with the design of many large machines in the a.c. turbo-generator section—now the Turbo-Generator Engineering Department.

Twenty-five years of outstanding leadership of the English Electric Co., Ltd., was marked last Friday by presentations from the company's employees to **Sir George H. Nelson,** BART., chairman and managing director. A gift of Georgian silver and a hand-made leather-bound book containing the signatures of many thousands of English Electric employees who had subscribed to a Presentation Fund, were handed to Sir George by **Mr Percy Horsfall,** a director of the company. A hand-made visitors' book was also handed to Lady Nelson. Taking part in the ceremony at Trentham

Sir George Nelson, right, receives the presentation from Mr P. Horsfall

Gardens, Staffs, were some 2,500 employees and their wives, most of the former having served the company for 25 years or more. Sir George obtained a sound early electrical training; before he was 18 he had gained a Mitchell exhibition, a Brush studentship, and a diploma in electrical engineering at the City and Guilds College, with which he has been closely connected ever since. Sir George became managing director of English Electric in 1930 at a difficult moment in the company's fortunes, but under his guidance it has become a world-famous industrial group with an immense range of activities. Sir George became chairman of the company in 1933.

For their part in attempting to save the life of a man who was electrocuted when climbing a pylon carrying 33 kV

lines last July, three employees of the South Eastern Electricity Board were recently presented with gifts by the Board. **Mr Norman Elliott,** the chairman, made the presentation. The employees were **Mr H. W. G. Hazzelrigg,** of Brighton; **Mr R. W. Beeke,** of Peacehaven (both linesmen); and **Mr R. W. Collings,** assistant engineer at the Board's mid-Sussex sub-area headquarters. **Mr H. Pryce-Jones,** mid-Sussex sub-area manager, recalled the incident last July, when Mr Albert Dray, a linesman, was fatally injured while inspecting overhead lines between Hurstpierpoint and Haywards Heath. Mr Hazzelrigg and Mr Beeke, he said, had risked their lives to climb the fatal pylon after Mr Dray. Mr Collings, who, at the time, was at the area station, Haywards Heath, showed a fine sense of intuition in keeping the line dead, although he was not then aware of the tragedy.

The B.B.C. announces the appointment of **Mr W. A. Roberts,** A.M.I.E.E., as regional engineer, Midland Region, in succession to **Mr J. A. Cooper,** B.SC. (ENG.), A.M.I.E.E., who will shortly be retiring from full time duties after 32 years service with the Corporation. Mr Roberts joined the Engineering Division of the B.B.C. in 1937. In 1941, after serving in the London Control Room and at the Droitwich transmitting station, he joined the H.Q. staff of the superintendent engineer (transmitters), where he assisted in the operational development of r.f. precision drive equipment. In 1945, he transferred to the engineering secretariat and became responsible for the control and development of patents and technical suggestions. He became assistant to the chief engineer in 1949 (in which capacity he represented the B.B.C. on national and international bodies), holding this post until being transferred to the senior superintendent engineer's department in 1951 for special duties.

Early in 1954 Mr Roberts was seconded to the Colonial Office as technical adviser on broadcasting development in the Colonies. He was a member of the Broadcasting Commission appointed by the Gold Coast Government in 1953 to advise on the development of broadcasting in that country, and later of the Commission which was appointed to study broadcasting development in Kenya. Since returning to the B.B.C. in May 1955, Mr Roberts has been attached to the chief engineer's department, where his duties have been concerned with the television service. He will be taking up his new duties on 1 Nov. Mr Cooper joined the B.B.C. in 1923 at the Birmingham station and became engineer-in-charge in the same year. He became an assistant superintendent engineer in 1934, and after serving in the Scottish and North Regions and in the superintendent engineer studios' department in London, he returned to the Midland Region headquarters in 1936 as engineer-in-charge of the Birmingham studio centre. After military service, Mr Cooper returned to the B.B.C. in Birmingham in 1945, as engineer-in-charge, and took over his present post in 1950.

Under a scheme initiated by the South Eastern Division of the C.E.A. this month, **Mr E. C. Avery,** power station superintendent at Littlebrook (420 MW capacity) has taken over new duties in the Division as liaison officer for one year in respect of the Brighton, Croydon, Kingston and Littlebrook power stations —a total capacity of 919 MW. **Mr F. R. Wilkinson,** deputy station superintendent at Littlebrook, has been promoted to acting station superintendent and **Mr D. Wright,** efficiency and operating engineer, to acting deputy station superintendent, and other power station engineers have been upgraded. It is intended to give other power station superintendents in the South Eastern Division similar experience and at the end of 12 months the Littlebrook staff involved in this experiment will revert to their former positions and grades so that another power station superintendent can take over liaison duties with the consequent upgrading of staff.

In order to coordinate further the interests of various departments concerned with electronics, Metropolitan-Vickers Electrical Co., Ltd., has now transferred the Industrial Process Control Engineering Department to the recently formed Electronics Department. **Mr R. H. Kelsall,** B.SC., A.M.I.E.E., formerly assistant chief engineer, Industrial Process Control Department, becomes assistant chief engineer (Industrial Process Control), Electronics Department.

The Minister of Fuel and Power, with the approval of the Prime Minister, has appointed **Mr R. J. Ayres,** C.B., C.B.E., to be deputy secretary in succession to **Sir Laurence Watkinson,** K.B.E., C.B., M.C., who is retiring from the Public Service on 1 Nov. next; and **Mr E. J. Meadon** to be accountant general in succession to Mr Ayres.

The Minister of Fuel and Power has re-appointed **Mrs G. H. Dunbar,** O.B.E., and **Mr E. A. Miles,** M.INST.C.E., M.I.E.E., M.I.MECH.E., as part-time members of the London Electricity Board, and **Mr Basil Curran,** O.B.E., in a similar capacity with the South Wales Electricity Board. The Minister has also appointed **Mr H. Mason Bibby,** M.ENG., M.I.MECH.E. (a director of Bibby and Son Ltd.), as a part-time member of the Merseyside and North Wales Electricity Board.

For over 30 years branch manager in Birmingham for Brown Brothers Ltd., **Mr H. S. Bond,** was recently the recipient of presentations at a farewell dinner given by the directors of the company on his retirement.

Mr S. S. Bagshaw has retired from the staff of the British Thomson-Houston Co.'s Publicity Department after 36 years' service.

Founder and managing director of Everetts Advertising Ltd., **Mr A. Everett Jones,** has been appointed a member of the Council of Industrial Design.

Until recently district commercial manager of the Cardiff West district, South Wales Electricity Board, **Mr C. E. Beames** was the recipient of presentations from colleagues on his retirement recently. He served at Cardiff for 23 years.

To mark his retirement from the position of district manager at Southport to the Merseyside and North Wales Electricity Board, a travelling case was presented to **Mr W. T. Gann,** M.B.E., M.I.E.E., last week, by **Mr P. Bregazzi,** M.I.E.E., A.M.I.MECH.E., the sub-area manager.

Mr E. Percy Edwards, of White House, 111 New St, Birmingham 2, has resigned from the Lapointe Machine Tool Co., Ltd., and has now joined Catmur Machine Tool Corporation Ltd., as Birmingham area sales manager. He will continue to operate from the same address.

Relinquishing the chairmanship of the Uganda Electricity Board at the end of last month, **Sir Charles Westlake** is spending a short holiday before returning to England. His successor is **Mr W. D. D. Fenton,** as we have already noted. Prior to leaving Kampala Sir Charles was guest-of-honour at a number of dinner parties, during which he received presentations. At one, Sir Andrew Cohen, Governor of Uganda, paid tribute to the work of Sir Charles who, he said, had conceived the Owen Falls hydro-electric scheme and brought it to fruition.

Following the retirement of **Mr G. C. Benson** after over 40 years' service, **Mr J. McLellan,** B.SC., has been appointed Northamptonshire sub-area engineer to the East Midlands Electricity Board. Since 1950 Mr McLellan has been assistant sub-area engineer there.

Mr B. Raynor has relinquished his position as technical representative with British Klockner Switchgear Ltd., and has now taken up a position with the Rheostatic Co., Ltd., in their Technical Department.

OBITUARY

Mr P. F. Deakin, late works director of Enfield Cables Ltd., died on 7 Oct.

Mr W. Findlay, former chief engineer and general manager of the National Boiler and General Insurance Co., Ltd., died on 7 Oct.

We extend our deepest sympathy to **Mr J. F. Stanley,** B.SC., A.C.G.I., M.I.E.E., assistant technical director of the British Standards Institution, on the death of his wife, Kathie, who was well known to many in the industry in connection with her prominent part in entertaining at I.E.C. and other functions.

Mr W. J. Rawlings, chairman of Rawlings Bros., electrical contractors, and a director of Rawlplug Ltd., died on 10 Oct., aged 62.

PROBLEMS AND PRACTICE

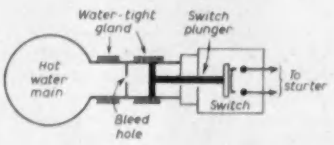
In Engineering

Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.

Vibrating Controller

A SMALL hot water circulating pump, driven by a 1 h.p. motor, was controlled by a pressure switch in the solenoid circuit of the motor starter. The pressure switch was fixed into the pipeline of the pump at the top of a five-storey building. The object was that the pump should start as soon as the pressure on the top floor began to drop off. After a short period of duty the motor got hot and, alas, without any tests was condemned as being too small.

The entire unit was replaced, the new motor being a 5 h.p. machine. The o/l in the starter were replaced to suit the 5 h.p. motor. This, too, started to overheat, but fortunately I happened to be passing the starter when I heard a peculiar "clicking." This turned out to



Means by which water hammer in pipes can be prevented from operating a pressure switch, the bleed hole being designed to transmit only slow pressure charges

be the solenoid operating with a vibrating action. With the cover off I shorted the pressure switch, and motor and starter worked perfectly. I then suspected a faulty connection on the switch but, on examination, found that the pipes were "hammering" at about the same frequency as the starter and decided that shock waves in the pipe were to blame. For a cure I suggested that a small bleed hole only should connect switch plunger and the water as shown in the diagram above.—*R. T. Clark.*

Shorting Switch

A CUSTOMER had bought a second-hand two circuit garage charger and left it for complete overhaul. Apart from the usual dirt accumulated during service conditions one transformer was found to be faulty. Like many such transformers it was not easy to remove because it meant labelling and disconnecting twelve long leads, and moreover the windings were of the pancake type and connected in parallel and series/parallel to feed the two selector switches.

One pair of secondary coils were burnt out and damaged the coils on either side. All burnt and damaged coils were rewound, the charger assembled, tested and returned to the customer. It was back again in a week with precisely the same trouble and with the same two coils burnt out, and in spite of the previous satisfactory test on load the transformer after the second rewinding was carefully examined to make sure that there were no opposed or incorrectly connected coils.

The second load test was still good until after a lot of experimenting it was found that in one of the 24 possible switch positions the primary current was greatly increased and the two coils in question became hot. The switch, a rotary type, was opened and it was found that the cams over which the rotating members rode were worn in one position and so allowed a contact to bridge two adjacent terminals which were connected to the coils in question thereby shortening them and causing their failure. It was then quite a straightforward matter to rectify what had been, initially, quite a puzzling fault.—*K. W.*

Earth-Neutral Faults

I MUST apologise for continuing these notes under the above heading but feel that some reply to the latest (6 Oct. issue) is necessary. Appreciating the rather neat metaphorical allusions to target erection, may I now add my agreement with much that R. A. has said in support of d.p. switches, but part company when Regulations are labelled as humbug, which appears to blame the laws for offences committed against them.

To replace all existing s.p. switches by d.p., with the necessary extensive alterations to wiring is obviously impracticable. If we are really to prevent the problem of dangerous installations brought about by careless work, unauthorised extensions by incompetent persons or other causes, then surely a reduction in voltage would be the best method, for with this, away goes the real danger and such headaches as earthing. The obstables, however, appear unsurmountable, when one considers that only now are we reaching standardisation at the present day voltage, and we have only to look at the efforts to standardise plugs and sockets to realise the remote hopes of success any attempt to change over to d.p. switches would have.

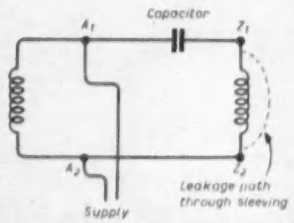
The only practical approach to greater safety appears therefore to, by statutory power, lay down a standard of work and maintain this by periodic examination and testing, as prescribed in Section 5 of the 13th edition of I.E.E. Regulations and the issue of the necessary certificate.—*T. H. Snelson.*

Troublesome Leads

I WAS recently called by a friend to examine a lawnmower which was powered by a capacitor-start f.h.p. motor. He was using the machine at the time and had reached the half-way stage when the motor refused to start. It was supplied from a 15 A 3-pin switched socket-outlet in a nearby garage, and controlled by a double-pole switch fixed to the outside of the motor terminal connection box.

When switched on there was "hum" but no sign of movement. Judging by the symptoms, I suspected a faulty electrolytic capacitor. However, on checking, the leads to the capacitor appeared to be intact, as were the connections to the double-pole control switch.

All the leads were insulated at the terminals with rubber sleeving, and two



Connections of capacitator motor powering the lawn mower, showing the short-circuit of the starting winding

I noticed were in a position in which they exerted considerable pressure against each other. On closer examination, I found that contact was being made through the rubber sleeving, just outside their respective terminals and there was also signs of a black deposit on the terminals block between these connections. As can be seen from the diagram, a short-circuit had developed due to this pressure caused by the bad positioning of the leads combined with gradual deterioration of the insulating material.

I fitted new sleeving, made the necessary adjustments and cleaned all deposit away from the terminals block to prevent any possible leakage. After re-connection, the motor was tried and all was well. It can be seen how easily a fault can and often does develop through pressure due to insufficient room or badly positioned leads.—*J. H. Robinson.*

Equipment for Industry

Ground Level Loading Transporter

EASING the loading and unloading of cable drums and heavy electrical equipment comes the "Eezion" ground-level loading trailer manufactured by IBBETT ENGINEERING CO., LTD., Kempston, Bedford. The trailer platform can be lowered hydraulically from its normal road clearance height of 13½ in. to ground level so that the platform stands only a chassis depth above the ground. This method permits safer, easier loading and a hinged tailboard when lowered, forms a low inclined ramp enabling loads to be wheeled directly on the transporter, making the use of forklift trucks and other loading systems almost unnecessary. When the platform is in the raised position, automatic locking arms remove all pressure from the hydraulic system and the hydraulic pump can be supplied for either manual or motor operation. In addition to the standard range of trailers which have capacities from 15 cwt to 5 tons, are two specially designed cable drum transporters having a maximum loading capacity of 5 tons. Chassis bodies of all versions are constructed from electrically welded longitudinal steel channels with steel tube cross members and the overall dimensions of the 5 ton cable drum carrier are 7½ ft x 18 ft.

New Electro-Pneumatic Relay

A TIME delay device consisting of a single pole changeover switch, electro-pneumatically operated and able to provide pre-selected delay intervals from 1/16th to 180 seconds, has been produced by ELECTRIC METHODS LTD., Stevenage, Herts. The pneumatic section incorporates spring-loaded synthetic rubber bellows with an adjustable air valve controlling the rate of expansion, this method is said to afford improved accuracy over a considerably wider timing range than with the conventional dashpot system. De-energising the d.c. solenoid permits the spring-loaded plunger to withdraw from the coil and compress the bellows. Energising the solenoid instantly causes the plunger to re-enter the coil, thereby permitting the bellows to expand under their own spring tension, adjustment of the air valve governs the rate of expansion. At the conclusion of this expansion period, a snap action double make and break switch automatically engages and remains so until the solenoid is de-energised. This relay obviously has numerous applications and the makers state that the unit is especially suitable for controlling sequential process operations where accuracy and reliability are essential.

Electro Methods' electro-pneumatic relay incorporates spring loaded rubber bellows

Designed to simplify loading and unloading heavy electrical equipment, the "Eezion" trailer seen here is one of two specially designed cable drum transporters

Electronic Controls reduce grinding cost

FROM the aspect of production costs the secret of satisfactory grinding lies in maintaining the feed at a rate which enables the grinder motor to utilise its maximum power output. With normal hopper feed equipment, overfeed and jamming can easily occur, resulting in wasted time clearing the machine. In practice it has been found that machine operators only permit a 60-70% maximum feed rate in order to maintain an uninterrupted flow of work. To improve operating efficiency, MAGNETIC EQUIPMENT CO., LTD., Lake Works, Portchester, Hants, have developed a motor-load controller and vibratory feeder. The control unit comprises an electronic device which responds to information transmitted by a current transformer, connected in series with the grinder motor supply. Maximum motor load current for optimum conditions and minimum current at which rate of feed should be increased, are preselected by two controls on the equipment. Individual load control units can be provided for motors rated from one, up to several hundred h.p., the controllers are completely enclosed and suitable for wall mounting providing the fixing position is reasonably free from vibration. Operating in conjunction with the controller, the electro-magnetic vibratory feeder automatically reduces the rate of feed when the input of unground material becomes excessive to that acceptable to the grinder motor. Available in a range covering a supply rate of ¼ to 600 tons per hour, the vibratory feeders may be installed under hoppers without structural alteration to the existing equipment.

Sheet Molybdenum for Valves

MOLYBDENUM has established itself in a variety of applications in the electrical manufacturing industry, particularly in electronic valve manufacture where its high strength at elevated temperatures is a valuable property. Now offering this metal are METRO-CUTANIT LTD., Grappenhall, Warrington, Lancs, who have recently installed equipment for manufacturing molybdenum sheet of high purity and ductility, which is particularly suitable for grids, anodes and structural parts of valves.

Improved Live Line Tester

WHEN maintaining e.h.t. lines and equipment, the operator must be confident that his live line test indicator affords maximum safety and be entirely above suspicion. As a result of practical experience gained over a number of years, EVERETT EDGCUMBE AND CO., LTD., Colindeep Lane, N.W.9, have modified their familiar live line tester to include a portable proving apparatus which verifies the working condition of the instrument. By providing a self-contained unit fitted with l.t. dry batteries supplying an h.t. voltage, the tester's continuity may be checked immediately before use. In addition, the l.t. batteries can be connected directly to the instrument's meter to deflect the movement, thus effectively proving that the indicator is in working order. The safety factor of this apparatus therefore has been improved and its versatility increased by extending accessories enabling the tester to cater for practically all types of switchgear and overhead lines. The complete test equipment is accommodated in a light-weight fitted carrying case of polished aluminium.

The Everett Edgcumbe 11 kV live line tester

Dust Proof "Flurolier" Arrives

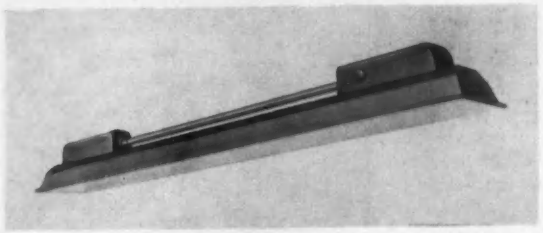
NOW coming through from the factory the new dustproof "Flurolier" fitting produced by THE BENJAMIN ELECTRIC LTD., Brantwood Rd, Tottenham, N.17, will be welcomed wherever factory dust or fluff might otherwise be detrimental.

The fitting consists of two cast aluminium alloy housings connected to a tube of similar material. (Switch or instant start gear can be accommodated in the housings.) The bottom cover of each housing is in two sections, one carrying a moulded cover which protects the lampholders and wires and the other being removable for the installation of suspension. The two bottom sections of each gear housing are fixed with captive screws of which the two centre screws are of a special type to prevent easy removal by unauthorised persons. The two sections interlock making these special screws effective to both.

One end of the moulded rubber cover houses a heavy pattern brass b.c. lampholder and makes an effective seal on the tube; the other end enters one section of the bottom cover making a continuous seal between tube and gear housing. Spring clips are used to hold the lamp in position and the reflector is held by spring loaded captive wing nut devices which render it easily detachable for maintenance and cleaning.

The fitting is designed to take any one of the Benjamin standard reflectors for one 80 W 5 ft lamp, closed top or upward light, in Crysteel vitreous enamel or Peropal finish.

The Dustproof "Flurolier" first seen in prototype at the ASEE Exhibition has now arrived



TRADE PUBLICATIONS

RESINS.—"Araldite" Epoxy Resins are described in latest issue of the Technical Notes by Aero Research Ltd., Duxford, Cambridge.

FLASHBULBS.—"Mazda Flash Photography" is a very useful booklet issued by British Thomson-Houston Ltd., Crown House, Aldwych, W.C.2, describing the uses and giving specifications of the Mazda range of photographic lamps and bulbs.

MOTOR STARTERS.—A lift size cutout "motor starter" folder with removable cutout centre is the clever idea of Allen West and Co., Ltd., Brighton, England, used to publicise their PSC4D Direct switching starter.

CONTROL GEAR.—Automation is the subject of the leading feature in "Electricity in Industry" No. 7 technical review of Lancashire Dynamo group of companies.

NYLON.—Hercules Powder Co., Ltd., 140 Park Lane, W.1, have issued a booklet dealing with the availability of Akulon Rod material which is a nylon distributed by this company for injection and extrusion moulding.

LAMPS.—Siemens Electric Lamps and Supplies Ltd., 38/39 Upper Thames St, E.C.4, have published an entirely new series of lamp catalogues. Four publications covering the range of lamps are available either separately or enclosed in a holder. Also available is a Siemens discount calculator, a ready-reckoner covering all lamp discount percentages on amounts of one penny to one thousand pounds.

TIME CONTROL.—The Automatic Light Controlling Co., Ltd., 100 Holdenshaw Rd, Bournemouth, have now produced a new catalogue covering time switches.

Warm Glow Popular blankets

STREAMLINED production methods and careful pruning of non-essentials have enabled the WARM GLOW CO., LTD., Leigh-on-Sea, Essex, to produce the "Popular" range of blankets which they offer as being the finest value for money in the field of electric blankets.

The range includes the Junior (50 in. x 28 in.) selling at 63s. retail inc. tax., the Single Popular (60 in. x 31 in.) selling at £3. 19s. 6d. retail inc. tax and the 60 in. x 20 in. double at £5. 19s. 6d. These are all light weight ivory coloured fleecy blankets trimmed with blue satin ribbon bindings and each has 3 yds of clean white flex with the new "Warm Glow" 2 pole cord switch fitted in the double and single sizes with the "night glow lamp." All the popular range blankets have waterproof elements, are washable at home, all are free from radio and TV interference, are fire proofed to the company's own specification and are packed in most attractive coloured display and presentation boxes.

For the Electrical Trade

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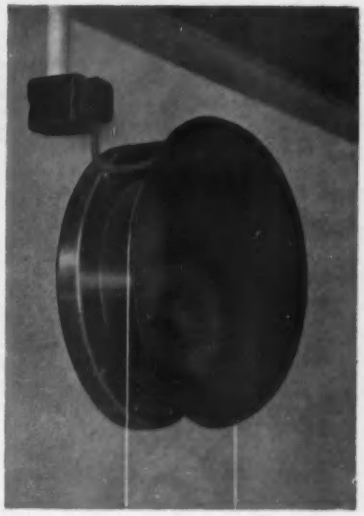
Moulded Impeller for "Xpelair" Fan

NEW moulded plastic impeller has been developed by THE GENERAL ELECTRIC CO., LTD., Magnet Hse, Kingsway, W.C.2, for their 7½ in. "Xpelair" window fan. The moulded blade prevents amplification of any magnetic noise which may be present in the motor at certain speeds.

At the same time the company has produced a light proof attachment for both the 7½ in. and 9½ in. diameter "Xpelair" fans so that they can be used in X-ray and photographic darkrooms. This attachment is an aluminium blackout cowl which can be fitted over the bellmouth entry of the fan.

Price of the Xpelair dark room cowl, ready for fixing, is £1. 18s. 6d. for the 7½ in. diameter size and £2. 11s. for the 9½ in. diameter size.

G.E.C. have also produced this light-tight cover for the Xpelair



NEWS OF THE WEEK

Gas toes the Publicity Line

Cuts in Press Advertising follow Minister's Letter

THE electricity supply industry's decision to curb promotional activities, which it now transpires, was a voluntary action, is being followed by similar restraint on the part of the Gas industry; a recent letter from the Minister of Fuel and Power having forced their hands. The C.E.A.'s decision to control their Press advertising was announced at the end of August, and was no doubt the result of deliberations following the Chancellor of the Exchequer's speech in the House of Commons on 25 July, asking the nationalised industries to help him solve current unfavourable economic trends. The letter from the Minister of Fuel and Power, sent incidentally to both the electricity and gas authorities, was despatched on 15 September, following the Chancellor's return from Istanbul. It suggested that a reduction of promotional activities would be advisable, we understand, and it was on that proposal that the Gas industry has now acted. The Gas Council have refused to comment on their intentions but some of the autonomous Boards have already taken action. The North Thames Board have reduced local paper advertisements by 50%, and cancelled all outstanding advertisements in London evening papers extending over the next four months. Similar action has been taken by the S. Eastern Board, we hear, but local paper bookings have been reduced by 33⅓%. These are the two Boards who took the plunge into commercial television and booked some half-dozen "spots" beginning on 1 October. The TV advertisements will not be cancelled, and will run their course as originally intended; as much emphasis having been placed on smoke abatement and clean air as on the particular gas appliance shown. The first appliance featured was a Radiation gas and coke fire. Similarly, poster advertising has been designed by the Boards to advocate clean air, and so will not be cancelled or altered in any way.

News of the cuts in gas advertising will bring some relief to the Electricity Boards' commercial staffs. Having to check their efforts to sell electricity and electrical appliances was, and is, a severe trial, but the bitterest pill they had to swallow was the knowledge that their gas rivals were continuing their activities unmolested.

N.W. BOARD CONSIDERING EFFECTS OF CAPITAL CUTS

POSSIBLE effect on rural electrification schemes of the Government's economic policy curtailing capital expenditure, is being considered by the N. Western Electricity Board. The Board's budget for rural schemes in the whole of their Area during the current financial year, is £600,000, over half of which has already been spent and the work done. The Board's chairman is anxious to correct some misunderstandings following his recent Press conference. The £600,000 already mentioned was for the whole area and not for Lakeland only; in fact some £240,000 was allocated for Lakeland. Similarly a figure of £500 per consumer has been quoted as the cost of supplying the rest of Lakeland by underground cable. That figure was the estimated cost for an overhead supply, and an underground installation would cost considerably more.

Australians Voluntarily impose H.P. Restrictions

Retailers' Help sought

AT a meeting in Melbourne, Australia, last week, hire-purchase companies from five States decided to seek the support of retailers and semi-Government bodies to impose a minimum 15% deposit on H.P. transactions. Forty-three companies met to find means of voluntarily curbing the growth of H.P. trading in the Commonwealth. The 15% minimum concerns household goods; on motor vehicles it is to be 33⅓% and a maximum repayment period of 30 months. Cars account for 80% of outstanding hire-purchase balances, and furniture and household appliances for only 16%.

This voluntary action on the part of Australian hire-purchase companies, follows legislation on the same basis in New Zealand some weeks ago. The Government's restrictions on imports into the Commonwealth were reported in these columns last week.

M.E.M. acquire Wiring Accessories Companies

AN announcement by the Midland Electric Manufacturing Co., Ltd., last week, stated that they have purchased the whole of the share capital of J. H. Tucker and Co., Ltd., of Tyseley, Birmingham. The acquisition has been financed out of the current resources of M.E.M. J. H. Tucker were originally established in 1892, and are one of the oldest firms manufacturing electrical wiring accessories. The organisation includes a subsidiary, the Kersons Manufacturing Co., Ltd., producing a similar range of products. We are informed that Mr J. B. Tucker, chairman and managing director will remain on the Board of J. H. Tucker and Co. until the end of the year to help in the transition, and Mr J. C. H. Tucker has been appointed general manager with a seat on the new Board of J. H. Tucker and Co.

Work begins on C.E.A.'s Biggest Power Station

INITIAL site work has begun on the C.E.A.'s new power station on the River Trent at High Marnham in Nottinghamshire. The Authority has now received the consent of the Minister of Fuel and Power to build the largest station yet projected in this country. Consent is for the largest amount of generating plant authorised by the Minister at one time, comprising five 200,000 kW turbo-generator sets and associated boiler plant providing a total of 1,370,000 h.p. Orders for some of the plant have in fact already been placed with the English Electric Co., Ltd., and International Combustion Ltd.

Each one of the High Marnham generating sets will be more powerful than most of the C.E.A.'s complete power stations. Only 26 of the 275 power stations house plant with a capacity greater than one of these machines. The five boilers which will serve the sets will also be outstanding. Operating at advanced steam conditions of very high pressure and heat, 2,450 lb per sq in. and 1060° F, they will produce a total of 3,125 tons of steam an hour. Advantages of this are twofold. They will produce electricity more cheaply by consuming less coal because of higher operating efficiency, and they will permit substantial economies in capital expenditure on both plant and buildings. High Marnham is expected to achieve an average annual thermal efficiency of 33%, which can be compared with the present average of all steam stations of 24·08%. First set at High Marnham is expected to begin operating in 1959. When fully completed, the station, designed by the Authority's headquarters engineering staff, will consume about 2½ million tons of coal a year.

Assisted Wiring Argument Almost at Deadlock

LATEST move by the Metropolitan Boroughs' Standing Joint Committee in their battle to have some scheme for assisted wiring reintroduced, is that they have referred the problem to the London Electricity Consultative Council, asking them to urge the Area Board to bring back a scheme similar to that operated by local authorities before nationalisation. This matter has been the subject of discussion and representation for nearly two years now. The committee's object is to help consumers repair faulty wiring by allowing them to pay by easy instalments.

Approaches have been made to the Board, who were unable to agree to such a scheme, and subsequently to the Ministers concerned, asking for directions that the help be extended on a national basis. The Ministries of Housing and Local Govt. and Fuel and Power, have replied that the matter was one for the L.E.B. to decide. They could not introduce legislation or grant subsidies. They suggested that the Committee should pursue the matter with the Board and the Consultative Council.

It would appear that the Metropolitan Boroughs' two-year fight to help consumers maintain their wiring installations in good state of repair, has almost reached a deadlock. The Board has replied direct in the negative, and that reply has been before the Consultative Council.

OFFICIAL PUBLICATIONS

BRITISH STANDARDS.
B.S.2640, 1955: Class II Oxy-Acetylene Welding of Steel Pipelines and Pipe Assemblies for Carrying Fluids. Amendment Slips: P.D. 2257: Electrical cable soldering sockets, amending B.S. 91, 1954; P.D. 2251: Graphical symbols for general electrical purposes, amending B.S. 108, 1951; P.D. 2283: Tractive armature d.c. neutral pole line relays for railway signalling, amending B.S. 519, 1950; P.D. 2281: Consumers' electricity control units, amending B.S. 1454, 1948; and P.D. 2284. Tractive armature d.c. neutral track and line relays for railway signalling, amending B.S. 1659, 1950.

HEAVY EQUIPMENT FOR POWER STATIONS (see p. 562) HMSO 3s. 6d.

NAT. JOINT ADVISORY COUNCIL OF ELECTRICITY SUPPLY IND. Annual Report for 1954-55. From Council, Winsley St, W.1 (see p. 574).

Lighting in Woollen and Worsted Industry

LATEST Technical Supplement (No. 7) just published by E.L.M.A. deals with Lighting for the Woollen and Worsted Industry. In a brief introduction, the booklet states that the transition from daylight to artificial light should not involve any deterioration in working conditions, and subsequent pages explain how this can be done. The Supplement is available from the Assoc., at 2 Savoy Hill, W.C.2, at 1s.

ELECTRICITY CARRIED TO CARAVAN SITE

FROM the north-west, a fortnight ago, came news of the installation of electric water heaters in chalets at a Blackpool holiday camp. A caravan site at Scarisbrick (Lancs) is the latest temporary residential centre to receive attention with the provision of an electricity supply.

To provide a power supply to each caravan, a 300 yd length of l.t. paper-insulated, lead-sheathed, single-wire armoured and served cable supplies 16 underground cast-iron compound-sealed boxes, from each of which a length of v.r.i. 250 V, lead-covered, steel-wire armoured and served cable supplies in turn the switch and fuses of a cubicle above ground. From each of the 16 cubicles a 3-core p.v.c. flexible leads to a small connection box under the floor of the caravan, and from there the supply is taken inside by a twin polythene-insulated and p.v.c.-sheathed cable. The cables were made by British Insulated Callender's Cables Ltd.

CLEAN AIR BILL

ANOTHER matter occupying the attention of the Metropolitan Boroughs' Standing Joint Committee at present, is the Clean Air Bill. The Committee is asking that the Government should bear a greater share in the concession to householders. Clause 10 of the Bill provides that owners will bear 30% of the cost of adaptations of fireplaces, the local authorities 30% and the Government 40%. The Committee have contacted other Associations of Local Authorities to see what action can be taken.

Safe Heaters on ITA

SAFETY in the Home is the theme of E. K. Cole's ITA commercial film featuring their Thermovent heater. The film is to be shown on 2 and 16 Nov. and on 7 Dec. It will show children playing safely in front of the heater while a commentary, spoken by a woman, will briefly draw attention to the salient sales points.

Plant Refresher Course in London This Winter

A COMPREHENSIVE refresher course for senior works and plant engineers in and around London is to be held in London this winter at the Royal Empire Society, Northumberland Ave, W.C.2. It is the first of its kind to be staged in the capital, but it represents the culmination of a series of eight held so far in Britain. The course comprises 19 lectures to be delivered on Wednesday evenings and beginning on 2 Nov. It covers an extensive range of subjects, including, among others, space heating, ventilation and air conditioning, steam utilisation, generation of industrial power by process steam, switchgear and factory distribution systems, electrical motive power and control, and materials handling. Fee for the course is £4. 4s. Full particulars may be had from the Course Secretary at the Empire Society.

Scottish Conference of Incorp. Plant Engineers

SCOTTISH Conference of the Incorp. Plant Engineers is to take place at Dunblane Hotel Hydro in the weekend 21-23 Oct. Programme for the conference was issued last week. The conference proper opens on the Saturday morning, after an informal dinner and dance the previous evening, with a talk by National President, Mr G. Sievewright. Later in the morning Mr A. A. Fulton, chief hydraulic civil engineer to the N. of Scotland Hydro-Electric Board, will speak on Highland Water Power. Reception by the President with dinner and dancing takes place in the evening. Other activities include a golf tournament, and visits to places of general interest. Organising secretary is Mr W. Geekie, 9 Dunden Crescent, Eskbank, Dalkeith.

ALL TICKETS SOLD

IT was announced by the E.I.B.A. last weekend that all tickets for the Association's Annual Ball have been sold. The Ball is to take place at Grosvenor House, on 11 Nov.

Caravan site at Scarisbrick, improved recently by the addition of an electricity supply

One-Day Conference for Teachers at Clacton

ANOTHER one-day conference on electrical housecraft is being organised by the E.A.W. for teachers. It is to take place at St. Osyth's Training College in Marine Parade, Clacton-on-Sea, on 19 Nov., and is open to teachers from Essex, Suffolk, Norfolk, Huntingdon and Bedfordshire. Similar conferences have been held in the past in the S. West, N. West, N. East, Yorkshire and Midlands. A packed programme is scheduled for the single day including instruction in the use and care of cookers, cooking equipment and refrigerators, and similar talks relating to laundry equipment; and also on the teaching of electrical housecraft in schools. Applications to attend the Clacton conference should reach E.A.W. headquarters, 25 Foubert's Place, W.1, by 30 Oct.

Fourth Welding Meeting

VENUE for the fourth in a series of meetings on Increasing Productivity by the Use of Welding organised by the British Welding Research Association, will be Manchester. The meeting will take place at the Lesser Free Trade Hall in Peter St on 13 and 14 Dec. Other meetings have been, or will be held in Glasgow, Bristol and Birmingham.

Military Tattoo staged in Copenhagen

The British Trade Fair at Copenhagen closes on Saturday. One of the highlights of the event, apart from the exhibition itself, was the Military Tattoo staged in the grounds of historic Rosenborg Palace. As previously reported the floodlighting was designed and supplied by the General Electric Co., Ltd. Main red brick facia of the Palace is lit by red neon floodlights, supplemented by sodium units to emphasise the white stone. The copper roof is picked out by blue fluorescent tubes mounted in the guttering, and additional tungsten floodlights are focused on the tops of the rear towers. The arena itself is floodlit from six towers, mounting a total of 60 1,500 W tungsten lamps. Extra light for spectators is provided by street-lighting lanterns at the backs of the stands.

Supply Industry Benefits from Discussions

THE work of the National Joint Advisory Council for the Electricity Supply Industry, and of its numerous district J.A.C. and local advisory committees, during the year 1954/55, is described at some length in the annual report just issued. With the local advisory committees, efficiency and safety were more often discussed than any other broad group of subjects. A feature of the year was the introduction of a Scholarship Scheme. Safety weeks were held at many power stations, in addition to a mobile exhibition which toured a wide area. An accident to an employee while he was lifting an electric cooker was the subject of a report considered by an L.A.C. As a result it was recommended that the Board should purchase a switch lifting truck so that the work might be done efficiently and safely.

The National Joint Advisory Council made 15 recommendations during the year, seven of them to the Central Authority only, and four to the Authority and the area boards. The recommendation on the recruitment and selection of apprentices is an instance of the use which can be made of information available through the co-operation of the electricity boards. An interim report on the incidence of chronic respiratory diseases in power stations in the N. West, Merseyside and North Wales Division has also been submitted.

The Suggestion Scheme continued to provide a steady flow of ideas to the industry mostly on engineering matters. Copies of the report, which is profusely illustrated, are obtainable by employees in the Electricity Supply Industry from their L.A.C. secretary.

News Bulletin for B.I.F. Exhibitors

CONSTANT liaison between British Industries Fairs Ltd. and past, present and potential exhibitors is to be maintained by the introduction of a journal, *B.I.F. Bulletin*, by the Fair's organisers. The journal is to be launched next month and will be sent free to some 12,000 clients. The publication will comprise 24 pages, be printed in two colours and contain details of plans, progress and personnel, news and pictures. It will be published in Nov., Jan., March, April, June, Sept. and Oct., these being the build-up months of the Fair. Commenting on the introduction of *B.I.F. Bulletin*, Mr Kenneth Horne, managing director, said there was a great need to maintain much closer contact with exhibitors during the months when the Fairs were being organised. It would tell them just how things were progressing.

PLANNING FOR LIGHT

A NEW campaign entitled Planning for Light is being inaugurated this autumn by the E.A.W. All the Association's 156 branches will be studying domestic lighting in all its aspects. While lighting is a subject always featured in branch work, this concentration on the matter by the entire organisation, will, they hope, make a big contribution towards improved illumination in the home.

New Design for Offices on Gaiety Theatre Site

LATEST development in the construction of a new building on the Aldwych, London, site of the old Gaiety Theatre is that the English Electric Co. has asked Dr Charles Holden to submit a design. When the site was originally acquired Dr Holden also submitted designs for the new building, but it was decided subsequently to hold an architectural competition and first place was given to the design of Mr Gordon Tait, of Sir John Burnet, Tait and Partners. Later, very careful consideration was given to the designs especially as regards the harmony between the contrasting styles of existing buildings and the new design, and as a result, it was decided to ask Mr Tait if he would consider creating another design, on a peripheral, as distinct from his spinal plan. Mr Tait, while appreciating the reasons, decided he would prefer to free the company to engage another architect. The negotiations were friendly, with the eventual appearance of the Aldwych site as a whole uppermost in their minds.

One I.o.M. Electricity Authority recommended Again

THERE should be one Electricity Authority responsible for the co-ordination of the generation, transmission, distribution and sales of electricity throughout the Isle of Man. That is the main recommendation of the Commission set up by the Governor nearly two years ago "to make recommendations to ensure an adequate supply of electricity at the cheapest possible rate." At present there are two undertakings: Douglas Corporation, and the Isle of Man Electricity Board which supplies all the island except Douglas. The members of the Commission, Sir William Robinson and Mr W. J. McGirvan, recommended these two undertakings should be vested in the new Authority with provisions similar to the 1947 Act. A further 2,000 kW diesel set should be installed at Peel for operation in 1957, otherwise no further capital expenditure should be incurred other than in normal development. It is estimated that the amalgamation would result in an increase in the Board's costs per unit of 0·172d. and a decrease in the Douglas costs per unit of 0·326d. By joint operation the selling prices could be reduced to the lowest prices that would be offered by the undertakings operating separately, it is suggested. The joint saving effected is estimated at £17,000 in 1956 rising to £24,000 in 1960, and this with uniform charges throughout the island. It is also proposed that the unit charge only should vary with changes in fuel prices.

A similar recommendation for a single Electricity Authority in the Island was part of the Nimmo Commission's report of 1948, which was not adopted.

106 Awards for Long Service

GOLD watches have been (or will be) presented to 106 of their employees by Kelvin and Hughes Ltd. in recognition of long service with the company. At the annual dinner last week, watches were presented to 71 employees with over 25 years service. On 24 Nov. another 35 long-service men and women will receive their watches at a dinner in Glasgow. These are in fact the first personal presentations made by the company as a reward for long service, although such loyalty has been recognised in other ways. Service is a basis for special payments during illness, and during holidays. Recently, a non-contributory retirement and death benefit scheme has been made available to everyone. Many employees are at present receiving pensions under an earlier non-contributory arrangement.

2,600 AT OPEN DAY

ON the suggestion of employees themselves, some 2,600 relatives and friends visited the Exide works of Chloride Batteries Ltd., near Manchester, one Saturday recently. Over 150 employees volunteered to man the machines.

Big Hawkins Sales Campaign opens on 24 October

ON Monday week (24 Oct.) L. G. Hawkins and Co., Ltd., open a carefully planned and extensive advertising campaign to boost sales of their wide range of products. Highlight of the campaign is a window dressing competition in which 23 prizes are offered with a top award of £100 to the winner. The competition is open to any dealer who buys one or more of the special competition packs containing a number of Hawkins products. Supporting the window displays will be extensive bookings in numerous magazines with national circulations. This sales drive will last a fortnight, closing on 5 Nov.

The First Half-Century

New rules as to overhead transmissions in France have been printed. In France, of course, continuous current up to 600 V is counted as "low pressure" so as to include all tramways and railways. With alternating current, however, its limit is still 150 V virtual, which appears as odd to an Englishman as, no doubt, our shrinking from a full and free admission of the necessity of bare wire overhead transmissions does to a Continental engineer. The rules lay it down that single bell insulators are not sufficient in the case of high pressure lines and without specifying what contrivance to that end is to be adopted, it is enacted that the wires must be protected from falling across roads. The distance which wires must be kept from houses or other buildings is one metre only. As regards the extra high pressure transmissions, which are becoming comparatively common, no attempt is made at present to standardise. It is simply laid down that anything above 10,000 V will be dealt with specially.
—*From our issue of* 12 *Oct.*, 1905.

Seeboard and Two Stores present Electricity Display

ANOTHER example of co-operation between the S.E. Electricity Board and local stores comes to us from Seaford in Sussex. A fortnight ago we reported that the Board had established a service centre in a prominent Brighton store. Now, we are informed that Seeboard have combined with Jakens of Seaford Ltd., and A. J. Simmons and Sons (Seaford) Ltd. to sponsor a Seaford Electric Home Exhibition. The show was staged in the local Queen's Hall at the end of last week. Apart from a comprehensive display of domestic electrical appliances, including a special stand contributed by Hoover Ltd., there was a goodly display of radio and television with special arrangements for on-the-spot reception of both B.B.C. and I.T.A. programmes. Visitors to the exhibition were also able to take part in two competitions with prizes of a Hoover steam iron and Junior vacuum cleaner.

Added interest has been given to demonstrations in the Board's Surrey sub-area by inviting the Bourneville team and an appliance manufacturer to co-operate. A series of cooker demonstrations were arranged in the sub-area's six showrooms, in which hot and cold dishes containing chocolate are prepared with an English Electric raised oven cooker and EA83 refrigerator. The afternoon demonstrations proved very popular with attendances of about 50 at each session, and it is likely that the idea will spread to other districts.

LONDON AIRPORT

WE have been asked to point out that the Electrical Apparatus Co., Ltd., has supplied a diversity of motor starting equipment for the Central Terminal Area electrical installation (described in our articles on Sept. 22 and 29) and elsewhere at London Airport.

JUBILEE SOCIAL BENEFITS

DURING his speech at Trentham Gardens last Friday, Sir George H. Nelson, chairman and managing director of the English Electric Co., Ltd., announced that to mark the occasion of his Silver Jubilee with the company, the Board of Directors had sanctioned a scheme to increase the pension benefit paid to certain categories of long-service hourly-rated employees of the Group. It had also been agreed to increase the life assurance of certain categories of hourly-paid employees.

Merseyside Tariffs raised as from this month

INCREASES in tariffs, effective as from 9 Oct., were announced by the Merseyside and N. Wales Electricity Board as we went to Press last week. Changes relate to the standard tariffs for domestic, commercial and industrial, and farm purposes.

Follow-on rate in the domestic tariff of ·85d. a unit has been increased to 1d. As regards the commercial and industrial rates the 1d. per unit for excess units has been raised to 1·125d. in tariffs 2, 3a and 3b and the existing tariff 4. The last is to be reclassed as 4a and an alternative (4b) offered. For lighting (separately metered) the charge will be 4½d. a unit, and for other purposes the rates will be 2d. a unit for a first block of units per quarter, and 1·125d. a unit in excess of that block.

The first block is calculated at 2,000 units a qtr up to 15 kW of total installed load (excluding lighting) plus 100 units a quarter for each complete additional kW installed, provided that in assessing the installed load, any apparatus for cooking, baking or water-heating shall be assessed at half its rated capacity. Finally, there is to be an alteration in the farm tariff.

The Follow-on rate in tariff F2 goes up to 1d. a unit, and the rate for excess units in F3 and F4 is increased to 1·125d. per unit.

Window Shopping at 30 m.p.h. in Malaya

A SPECIAL "quick-look" display room has been built in the front of the General Electric Co.'s new offices and stores situated on the wide Johore Bahru trunk road linking Singapore with the mainland of Malaya. The road is used exclusively by vehicular traffic moving at speed, and the frontage of the building stands back from the road, but being in a prominent position is seemed unthinkable to ignore the opportunity of advertising the company's products.

The display room has a wide opening and space to accommodate a range of cookers and refrigerators set permanently in a semi-circle to allow the widest possible angles of vision for the speedy window shoppers. The result allows a total window gazing time of 5 sec. for the occupants of passing cars. At night the display is illuminated. Feature of the display room is the absence of a glass front window. Visitors are able to step straight into the room from the forecourt, but unwelcome visitors are kept away by stalwart Sikh jagas (watchmen).

The Tensor Club

THE current tour of the U.K. by Gabriel Kron and his lectures on tensor analysis has focused attention on the comparatively new Tensor Club of Great Britain. It was not until the years immediately preceding the first World War that Einstein found in tensor analysis and matrix theory mathematical forms and techniques which enabled him to formulate his famous theory of relativity. The possibilities were still not generally known to engineers until the mid-1930's. The formation of a club was first considered in 1950, and after preliminary meetings the Club was inaugurated in July of that year. By the end of the first fiscal year the membership had grown to 42, with members in the U.S., Australia, India, Brazil and China, besides the U.K. of course. At 30 June last, membership totalled 137; a satisfactory state in a specialised field of applied mathematics. There is also the Matrix and Tensor Quarterly and a flourishing lending library of some 40 books and 100 papers. Bulk of the work in forming and running the club has been very ably carried out by Mr S. Austen Stigant, 7 Courtlands Ave, Hayes, Kent, and Mr W. J. Gibbs of 53 Hillmorton Rd, Rugby.

Electrical Society formed in Manchester

THE electrical needs of Manchester are being supplied fully these days, it would appear from recent events in the city. Last week we noted the opening of a Lighting Service Bureau, and we record this week the activities of the newly formed Manchester Electrical Society. The Society has met once already this year but the first full session will get under way in earnest with the Presidential Address on 31 Oct. This will be delivered by the Society's first President, Mr T. E. Daniel, deputy chairman of the N.W. Electricity Board. Other meetings have been arranged for the last Monday of each month (except Dec.), and these will take place at the Waldorf Hotel in Cooper St. Inaugural meeting was held in Sept. last year. Members of the electrical industry in Manchester and its surrounding districts will undoubtedly welcome this new opportunity to meet, listen to prominent speakers and discuss topics of current interest. Those interested should approach the secretary, Mr E. B. Leah, at 88 Mosley St, Manchester 2. Subscriptions for the 1955-56 session have been fixed at £1. 1s.

Cambridge University to have Special Government Grant

CAMBRIDGE University is to be given a special grant to provide extra facilities in its engineering department as part of the Government's programme for the development of higher technological education. The Universities at Manchester, Leeds, Birmingham and Glasgow already benefit in this way. The grant will enable new constructional work and the establishment of research posts. Four Readerships in Engineering have already been filled, one by Mr R. G. Rhoden, formerly of Metropolitan-Vickers Electrical Co., Ltd. The new facilities will establish on a firmer basis the research activities which have hitherto depended on support from industry.

New College of Technology forecast for Manchester

NEWS that a new central college of technology was to be built near the university was given by Manchester's deputy town clerk at a Ministry of Housing and Local Government public inquiry. During the inquiry it was stated that part of a site being discussed would be required for a new college which was intended to replace the existing one. The Corporation did not anticipate any difficulty in starting work in 10 years' time, if not earlier. Details had not yet been discussed, but the college would be built in the area now scheduled in the city's draft development plan as an educational zone. This would contain colleges of art and domestic economy, an adult education institute, and a county college. The new college of technology is expected to cost about £750,000.

Lighting in Lyons' New Corner House Restaurant

ALTHOUGH acoustics was the main concern of J. Lyons and Co., Ltd., when designing their "Restful Tray" self-service restaurant at the Tottenham Court Rd, London, Corner House, lighting and heating also played a big part in the ultimate achievement of restfulness and comfort. Illumination is by louvred spotlights comprising fittings by Troughton and Young (with 100 W lamps), and World Wide Superlight (150 W lamps), set in rows across the ceiling, and in pairs in alcoves; the latter having false windows and concealed decorative lighting. Wall brackets by Falk Stadelmann complete the lighting installation. On the service counter meals are kept hot by a row of 16 infra-red lamps in fittings specially-designed and made by F. H. Pride of Clapham.

The acoustic arrangements are not, of course, electrical. Three steps have been taken. Walls, seemingly stylishly panelled, have been subjected to slit resonator treatment; the ceiling is of mineral wool absorbent faced with perforated steel plates to minimise sound reflection; and a thick carpet has been laid on Dunlopillo underlay instead of traditional felt.

Engineers from seven Continental countries are undergoing a week's instruction on clutch and brake equipment at the St. Helens Auckland factory of Westool Ltd., in preparation for a sales drive. They will study the Warner equipment for which the company secured sole manufacturing and distribution rights in Europe. From left to right in the picture are Mr Bengt Hammarskild (Sweden), Mr W. Joppien (Germany), Mr H. G. Midgley, manager of Warner Div., Mr A. L. Hunking, managing director, Mr R. W. Smith, sales manager, Col. C. E. MacKellar, director, Mr Otto Boss (Switzerland), Mr J. B. Bailey, application engineer of Warner Div., Mr Eriksson (Sweden), Mr Florand (France), and Mr Maque (Belgium). We hear that as a result of increased demand, the company's factory is to be further extended

Area Board Progress

IN Table II on page 520 in last week's article under the above heading, the figures for the Midlands Electricity Board should have been: Farms connected, 16,301; increase in farming consumers, 1,296; thousands of units purchased by farms, 105,020; farming units/farming consumers, 6,440; and not as stated.

NEWS IN BRIEF

An exhibition showing the development of the industrial arts during the past 100 years is being held to mark the centenary of the Patent Office library. The library, in Southampton Bldgs., off Chancery Lane, W.C.2, was founded in 1855.

Aberdeen town council has rejected by 15 votes to 12 a recommendation by their finance committee that the present practice of supplying gas and electric cookers to tenants of municipal houses should be discontinued.

The Lightmongers are to hold their annual meeting and dinner at Carrs Restaurant in the Strand (London) on 1 Nov.

G.E.C. have received an order for a 4,500 kW pass-out turbo-alternator set from the Westfield Paper Co., Ltd., West Lothian.

Two engineers from Siam arrived in London last week to take up a two-year scholarship with pay with the Brush Group Ltd.

An extensive V.H.F. radio control scheme for the police forces of Berwick, Roxburgh and Selkirk, has been inaugurated by the Duke of Buccleuch recently. The ceremony took place at Jedburgh. The radio network was supplied and installed by Marconi's Wireless Telegraph Co., Ltd.

Enfield Cables held their home sales conference at Victoria Hse, Southampton Row, W.C.1, at the end of last month, under the chairmanship of Mr Rex Bate, sales director. Delegates were entertained to dinner at the Waldorf Hotel on the first evening.

A party of Shropshire electrical contractors, headed by Mr Tom Berrow, of Shrewsbury, paid a visit to James Beresford and Son Ltd.'s Stork Works at Kitts Green, Birmingham.

A Sale by Auction of Government surplus stock is to take place at the Ministry of Works store in Water Lane, Clifton, York, on 19 Oct. There are various electrical commodities available.

Sayings OF THE WEEK

"The public should have some elementary knowledge of the machines they handle. We have to pass a driving test, so why not an electrical test?" . . . MR M. G. TRESTAIL, writing to the *Evening Standard*.

"There is a vital necessity to increase production in this country. One way is to get the workers to work. The other way is to replace them with new, mechanical, electrical devices." . . . MR R. A. MARRYAT, president of the E.C.A., speaking at Southampton.

"We are living in a world of our own in which the customer is always wrong." . . . LORD COLERAINE, speaking at the Incorporated Society of British Advertisers' conference.

ELECTRIC SUPPLY NEWS

Burnham-on-Sea

The Council's Building and Sanitary Committee has decided not to oppose the use of overhead cables for the development of land adjoining the South Esplanade, because they do not wish to contribute to the additional cost of underground cables. At the recent meeting the surveyor, Mr G. Harvey Mayhew, said it would mean that the h.v. overhead line would pass across country between Highbridge Rd and Pillsmouth Farm. It would be over agricultural land. When it reached the estate the cables would still be overhead.

Isle of Man

In order to pay the arbitration award of £63,000 to the Douglas Corporation, the Isle of Man Electricity Board is to present a Bill in the next session of Tynwald which will empower the Board to borrow the necessary money. The arbitrator's award of £63,000 arose out of the action of the Board ceasing to take a bulk supply from the corporation. The compensation has not yet been paid and the Board is at present without powers to borrow funds for the purpose.

Liverpool

To improve the network of the Merseyside and North Wales Electricity Board at Waterloo and Crosby, work has started on a £218,000 scheme. The project will provide reinforcement through 33 kV cables, and the present 6 kV system in future will be operated at 11 kV.

Musselburgh

The South of Scotland Electricity Board have approved a scheme for the reinforcement of supply to Musselburgh. Two 11 kV rings will be established by laying over 1,400 yd of 11 kV cable and reconstructing an existing overhead line. A new substation will also be built and equipped. The scheme will cost approximately £12,800 and will be completed during the summer of 1956.

Northfleet

The C.E.A. has made application to the Minister of Fuel and Power for his consent to the establishment of the proposed new Northfleet power station. In the present programme, the station is scheduled to have three 120 MW sets with three 860 lb/hr boilers.

Roxburghshire

The tiny village of Riccarton, accessible only by a wild moorland track and by train, was given an electricity supply by the South of Scotland Electricity Board recently. In all, 37 houses are connected. In the delivery of electric cookers a horse drawn sledge was used, for the village has no road. The switching on ceremony was performed by Mr J. E. S. Nisbet, deputy convenor of Roxburgh County Council. Mr William Hutton, a member of the Board, paid tribute to the engineers, who had surmounted many difficulties, and to the farmer who provided a horse to haul everything up on to the moorlands piece by piece.

Ryde (I.O.W.)

The proposal of the Southern Electricity Board to erect an overhead line through the valley at Springvale, near Seaview, was the subject of an inquiry held by Mr A. H. F. Linton on behalf of the Minister of Fuel and Power a few days ago. Objectors included the Isle of Wight County Council and Ryde Borough Council. For the Board, Mr A. H. Thomas, sub-area engineer, said the proposed scheme was to reinforce the existing low voltage system in the Springvale area by establishing a substation, and feed it by overhead lines from the cable running from Ryde to Nettlestone. The County Council had suggested as an alternative that the new substation should be fed from the existing substation at Puckpool. They had indicated that they would not object to an o.h. line across park land to the south of Springvale, provided that the Board laid underground cables at the start and finish of the line. The Board's o.h. scheme was estimated to cost £1,152 and the Council's scheme £2,286. It would also be possible to run an underground cable from the same point as the Board proposed their overhead line, but the cost would be £3,048. Mr R. W. Rose, county planning officer, said that a large number of Island residents were people who had chosen to live there after retirement, and, as was also well known, the Island depended for its prosperity on its holiday trade. To retain both this type of resident and visitor, it was necessary to retain the amenities and character of the Island.

LIGHTING SCHEMES

Blackpool. The Electrical Services Committee is asking for £86,589 for next year's illuminations.

Greenwich. The Council have decided to spend £114,000 on converting the borough's side street lighting to electricity.

Havant. The Council has approved a £2,500 lighting scheme for a new bridge joining Hayling Island with the mainland.

Hornsey. Conversion of 73 more roads to sodium lighting at a cost of £20,000 has been approved by the B.C.

Islington. The Council is to improve street lighting in Caledonian Rd at a cost of £10,062.

Perth. T.C. has approved the installation of sodium lighting in Dundee Rd and Isla Rd.

COMPANY ACTIVITIES

FULL accounts of Associated Insulation Products confirm the further severe decline in trading profits for the year 1954 to £266,000. They compare with £367,000 in 1953 and £556,000 in 1952. There is some consolation in the fact that a setback in the main is due to the group's efforts to earn valuable dollars, for it is a considerable overall loss by the U.S.A. companies which cut total earnings. New and satisfactory arrangements with the Minnesota Mining and Manufacturing Co. and the strong financial position gives some justification for the maintenance of the 20% dividend rate. The group is engaged in the electrical, plastics, and mica trades and the 5s. shares around 12s. 6d. yield about 8%, an excellent return if the buyer is prepared to take the risk of further disappointments in an obviously mobile situation.

Tube Investments should be an ideal company for both Mr Butler and Mr Gaitskell, except perhaps for its generous treatment in giving shareholders a one-for-one "rights" issue at 22s. 6d. against a market price of 91s. 3d. at the time. That at least should ensure a successful raising of £8·15m in difficult market times. Shareholders who cannot afford to put up the money are not to be penalised. Their shares are to be sold on the market and the proceeds divided between them. Apart from that generosity, the board have constantly pursued an almost niggardly dividend policy. Its latest 22½% is out of earnings of something like 100% on the present Ordinary capital. It must be covered at least five times against an average of less than 3% for those companies which comprise the basis of the *Financial Times* Ordinary share index. This time directors forecast 14%. Assuming there is no further increase in the £8·5m profit (against £5·7m) which is unlikely, this would represent about £230,000 net or just under 5% on the new capital—an excellent example of the board's dividend restraint.

All the main current trading factors appear to be exemplified in the 1954/5 results of Newton Bros. (Derby), manufacturers of electrical equipment. Profits are slightly lower—£271,000 against £278,000—probably due to the common complaint of lower margins. But the net profit is £26,000 higher at £121,000 because of the ending of E.P.L. Exports are down from 21% of total sales to 18½% because of increased competition, also a general obstacle at the moment. One difference is that the company still has to face up to an extensive reconditioning and rebuilding programme at a time when Mr Butler is getting tough. Fortunately the 20% dividend is covered nearly four times and the liquid position is strong, so that the board may be able to finance its programme without too much outside aid.—*From our City Correspondent.*

Associated Electrical Industries Ltd.

The directors of this concern have offered to purchase the whole of the Ordinary share capital of the Hill Top Foundry Co., at 4s. 6d. per 1s. share. The latter's authorised and issued capital is £60,000 in 1s. shares; the directors intend to accept the offer in respect of their shares and recommend acceptance to Ordinary shareholders. It is stated that the policy of A.E.I. will be to increase production capacity of the foundry and to improve service to customers and the companies in the A.E.I. group.

Cape Electric Tramways (1949) Ltd.

The group net profit for the year to 30 June last is £141,203 (*£112,991*). The distribution is 8% (7½%).

Holophane Ltd

For the year ended 30 June last the net profit after taxation is £65,793 (*£48,333*). A final dividend of 22½% increases the total by 5% to 30%.

A. H. Hunt (Capacitors) Ltd.

It is proposed to increase the authorised capital to £500,000 by the creation of 1½ million Ordinary 4s. shares. Part of the capital development programme will be financed out of resources but the balance will be raised by an issue of new Ordinary shares in addition to capitalising reserves.

Morphy-Richards Ltd

Another highly successful year is reported by this concern. For the twelve months ended 30 June last the group profit is £472,728, compared with £317,881 for the previous period. After all charges, including taxation, the group net profit is £211,127 (*£103,842*). The final dividend is increased by 5% to 30% on the Ordinary capital of which a small portion ranks only for 15%. The total distribution is thus 50%.

Newton Brothers (Derby) Ltd

Orders outstanding at 31 Mar. last were considerably less than a year earlier, due to the systematic reduction of the backlog, but were still considerable, Mr F. V. Pope, the chairman, stated at the meeting last week. Since the end of Mar. the rate of incoming orders has about equalled the present production rate without regular overtime. It is now planned to put in hand the extensive reconditioning of the buildings which has been contemplated for some years. Export work last year amounted to 18½% of the total production as compared with 21% in the previous year.

Year to 31 Mar.	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1951	167,094	60,935	73	13⅛	6/1	4/8
1952	155,070	48,501	58	16½	5/6	4/1
1953	181,625	74,445	49	10*	3/7	2/3
1954	278,108	96,303	63	17½	5/10	2/9
1955	271,355	122,558	77	20	9/1	5/6

*Plus 75% capital bonus.

North of Scotland H. E. Board

The Board last week issued £15 millions of 4½% stock 1965-1966 at 98% to the National Debt Commissioners, thus increase the capital to £130½ millions. The new stock is to repay temporary advances from Scottish banks, defraying further expenditure on constructional schemes, etc.

Perak River Hydro-Electric Co.

The profit for the year ended 31 July last has risen to £660,200, as against £582,151 for the previous year. The dividend is again 10%. It is also proposed to capitalise £437,500 of reserves in a one-for-four scrip issue, subject to Treasury consent.

Permati Ltd.

It is proposed to offer to members £300,000 Unsecured Convertible Loan Stock at par, particulars of which will be announced later, and to capitalise £50,000 standing to the credit of the Share Premium account. An extra-ordinary meeting is to be held on 24 Oct. to increase the authorised share capital from £350,000 to £520,000.

Pernambuco Tramways and Power Co

The net operating revenue for 1954 is £34,808—a decrease of £126,425, which the directors state is due principally to the decline in the value of the cruzeiro in relation to £ and an increase in the tramways' operating loss. After allowing for other income, interest and other deductions and exchange loss, the company incurred a loss of £198,211.

Peter Brotherhood Ltd.

After charging taxation, etc., the net profit for the year to 31 Mar. last is £184,664 (*£174,904*). A final dividend of 15% makes the total 20% (*30%*), but on doubled capital.

Tube Investments Ltd

There is to be a one-for-one rights issue at 22s. 6d. purchase, raising £8,153,360. The authorised capital is being increased by £8·7 millions to £23 millions. The directors expect to pay an interim of 5½% next May and in due course a final dividend of 7% for the year ending 31 July next, on the existing capital, for a record turnover with a jump in profits is expected.

Dividends Declared

Drayton Regulator and Instrument Co.—Interim 5% (*10%*).

Marconi International Marine Communication Co.—Interim 4% (*same*).

Reliance-Clifton Cables and Industrial Products. Interim 11% (*10%*).

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COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

14 Oct.—Inverness. Electrical work in Hall-Church at Hilton.—See 6 Oct. issue.

15 Oct.—Ashington U.D.C. Installations in ten blocks of flats on Beamsley Terrace site.—See 6 Oct. issue.

15 Oct.—Co. Galway. Installation at girls' and infants' school at Tuam.—See 6 Oct. issue.

15 Oct.—Kendal T.C. Mercury vapour lighting units for Group A street lighting in Lound and Burton Rds.—Advertised in 22 Sept. issue.

15 Oct.—Newcastle-on-Tyne T.C. Automatic telephone system for Transport and Electricity Undertaking.—Advertised in 22 Sept. issue.

15 Oct.—Ripley U.D.C. Class A sodium and fluorescent street lighting along A.61. —See 6 Oct. issue.

16 Oct.—Old Fletton U.D.C. Group A sodium discharge lamps and Group B mercury discharge fluorescent lamps with steel and cast iron columns, etc.—See 29 Sept. issue.

17 Oct.—Wallasey T.C. Installation at Lingham junior school.—Advertised in 22 Sept. issue.

18 Oct.—Alton U.D.C. Electrical wiring in 44 council houses. Engineer and Surveyor, Council Offices, High St.—Advertised in 29 Sept. issue.

18 Oct.—East Riding. Stage lighting and control equipment required for S. Hunsley county secondary school. County Architect, County Hall, Beverley.

18 Oct.—Enniskillen (N.I.) R.D.C. Electrically-powered, water pumping apparatus, etc., for Bellanaleck and Arney water supply scheme.—See 29 Sept. issue.

18 Oct.—Limavady. Electrical heating of Drumachose Presbyterian Church, Limavady. Secretary is John Thompson, Killeen, Limavady.

18 Oct.—N. Ireland. Automatic telephone exchange at Strabane.—See 22 Sept. issue.

18 Oct.—Maidstone T.C. Installation in block of flats on Shepway estate.—See 6 Oct. issue.

19 Oct.—Belfast T.C. Lighting installation in sports pavilions in Ormean and Victoria Parks. City Surveyor's Dept., Architectural Section (Room 53), City Hall.

19 Oct.—Omagh (N.I.). Installation at Gillygooley primary school.—See 6 Oct. issue.

19 Oct.—South Antrim. Lamps during 1956 to Lagan Valley and Lisburn Hospitals.—See 6 Oct. issue.

19 Oct.—West Lothian. Electrical work in 14 houses in Baker St, Newtown, Bo'ness. Apply by above date to J. Calder, county clerk, County Buildings, Linlithgow.

20 Oct.—Edinburgh T.C. Electrical installation on new mezzanine floor of Central Library. City Architect's Office.

20 Oct.—Rochdale T.C. Installation at Townhead offices.—See 6 Oct. issue.

20 Oct.—Watford T.C. Supply and erection of 362 concrete columns, 82 fluorescent and 280 sodium lanterns, etc., for Group A street lighting scheme. Apply by above date to F. C. Sage, Borough Engineer and Surveyor, Town Hall.

21 Oct.—Co. Antrim. Installation in Welfare centre at Ballyclare.—See 6 Oct. issue.

21 Oct.—Isle of Ely T.C. Supply and erection of 84 140 W sodium lanterns, steel columns, etc., for street lighting scheme along trunk road A.10. Engineer and Surveyor, J. V. G. Shilston, Council Offices, Lynn Rd, Ely.

22 Oct.—Clydebank T.C. Supply of poles, lanterns, auxiliary gear and overhead cable for street lighting along Great Western Rd, A.82. J. Craig, Inspector of Lighting, Lighting Dept., Melfort Ave.

22 Oct.—Dagenham T.C. Group A lighting units in Eastern Ave.—See 6 Oct. issue.

22 Oct.—Co. Down. Installation at Hillsborough primary school.—See 6 Oct. issue.

22 Oct.—Durham. Electrical equipment to Windlestone Hall residential school.—See 6 Oct. issue.

24 Oct.—Ashton-under-Lyne T.C. Electrical installation in 28 flats on Taunton estate. Borough Engineer and Surveyor, Municipal Offices. Deposit £2. 2s.

24 Oct.—Birmingham T.C. Installation of lighting and power at Summer Lane day nursery. Sir Herbert J. Manzoni, City Engineer and Surveyor, Civic Centre. Deposit £2. 2s.

24 Oct.—Bowland (Lancs) R.D.C. Electrically-operated pumping plant.—See 29 Sept. issue.

24 Oct.—Middlesbrough. 150 h.p. slip-ring motor and vertical centrifugal pump with switchgear, etc., at Fighting Cocks pumping station.—See 6 Oct. issue.

24 Oct.—Northampton T.C. Class B street lamps, comprising steel columns, tungsten lanterns, etc.—Advertised in 6 Oct. issue.

24 Oct.—Peterlee. Installation in 136 houses on Dene House sites.—See 6 Oct. issue.

24 Oct.—Southampton T. C. Rewiring and improvement at Portswood secondary school.—Advertised in 6 Oct. issue.

25 Oct.—Longbenton U.D.C. Electrical installation in 40 houses in Dudley Lane, Seaton Burn. A. E. Sweetman, Engineer and Surveyor, Council Offices, Forest Hall. Deposit £2. 2s.

26 Oct.—West Hartlepool T.C. Installation in Brierton county secondary school. —See 6 Oct. issue.

27 Oct.—Belfast T.C. Condensate chemical treatment plant for turbo-alternators. —Advertised in 15 Sept. issue.

27 Oct.—Newbury T.C. Lanterns, steel columns and control gear for trunk road lighting along A.4.—Advertised in 29 Sept. issue.

28 Oct.—Clay Cross U.D.C. Group A lighting units over ¼ mile of A.61.—Advertised in 29 Sept. issue.

28 Oct.—Hyde T.C. Erection, wiring, etc., of 160 sodium and 4 fluorescent units; also provision of lanterns, brackets, concrete columns and electrical equipment for above units. Separate contracts for Group A street lighting schemes. Borough Surveyor's Office, Municipal Buildings, Greenfield St.

29 Oct.—Milford Haven U.D.C. Concrete columns with sodium lanterns, for Group A street lighting along A.4076.—See 6 Oct. issue.

31 Oct.—Reigate T.C. Supply and erection of Class A street lighting equipment on A.23 trunk road. Borough Surveyor, Town Hall.—Advertised in this issue.

31 Oct.—Stranraer T.C. Installation in block of flats in Foundry Lane.—See 29 Sept. issue.

4 Nov.—Berwickshire. Electrical installation in total of 64 houses on eight sites, including 30 at Earlston. County Architect, 12 Newtown St, Duns.

5 Nov.—Leeds T.C. Group A street lighting schemes in Scott Hall and Harrogate Rds, and in Easterley Rd.—Advertised in 6 Oct. issue.

5 Nov.—Ludlow T.C. Supply and erection of 53 sodium lighting units of 140 W on major part of Newport-Shrewsbury trunk road A.49. Borough Surveyor, Municipal Offices.—Advertised in this issue.

5 Nov.—New Windsor T.C. Supplies of

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries

A Selection from the 137 queries answered this week

"Arcason" dishwashers, address for? N.W.B.—The makers, Arcason Products, are no longer operating but Mr B. Dunglinson, Electroflo Meters Co., Ltd., Abbey Rd, N.W.10, offers information regarding spares.

Circulating pumps for 5 ft head at 4 gal. and 20 gal. per min., makers of? A.W. —Sigmund Pumps Ltd., 116 Terminal Hse, 52 Grosvenor Gdns, S.W.1.

"Gaggia" coffee makers, address for? H.A.D.—Riservato Partners Ltd., 10 Dean St, W.1.

"Eugene" hairdryers, makers of? S.E.— Eugene Ltd., 143 Regent St, W.1.

B.O.M. Manufacturing and Supply Co., Ltd., address for? S.E.B.—We are unable to find any address other than 264a West End Lane, N.W.6, which appears to be no longer operative. Repairs to "Gecko" percolators supplied by this company can be undertaken by the Islington Metal and Plating Works Ltd., Torrens St, E.C.1.

"Roblec" irons, makers of? E.B.— Robson Electrical Products Ltd., Union St, West Bromwich, Staffs.

ANSWER WANTED

"Coronet" refrigerator unit, makers of? S.E.

electric lamps, and of electric fittings and cable during 1956. Borough Engineer, Kipling Building, Alma Rd.

7 Nov.—Merthyr Tydfil. Pumping plant for Taf Fechan Water Board, comprising electrically-driven pumps with motors, starters, switchgear and instruments.—See 29 Sept. issue.

7 Nov.—Skipton U.D.C. Supply and erection of 157 400 W mercury vapour discharge street lighting units with lanterns, lamps, control gear, and steel columns for trunk road. K. B. Robinson, Engineer and Surveyor, Town Hall. Deposit £1. 1s.

19 Nov.—Co. Galway. Pumping and filtration plant at Oughterard.—See 29 Sept. issue.

28 Nov.—Fifeshire. Supply and erection of 40 steel columns, brackets, sodium lanterns and ancillary gear for Group A lighting at Windygates. County Surveyor, County Offices, Belfield, Cupar.

5 Dec.—Leeds T.C. Electrically-driven centrifugal pumps with motors and switchgear for Headingley filtration works pumping station.—See 6 Oct. issue.

12 Dec.—Easthampstead R.D.C. Provision and erection of about four Group A and 300 Group B street lighting units. Names to H. Charlesworth, Engineer and Surveyor, Council Offices, Church Rd, Bracknell, Berks. Deposit £2. 2s.—Advertised in this issue.

No date stated—N. of Scotland H.E. Board. Lighting, heating and auxiliary cabling at Meig Dam in Glascarnoch-Luichart-Torr Achilty project. Merz and McLellan, 72a George St, Edinburgh 2. Deposit £2. 2s.—Advertised in this issue.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Rd, W.C.1, quoting reference.*

7 Nov.—New Zealand. Supply of total of 1,014 ammeters, moving-coil type d.c. single range, suitable for ¼ in. to 3/16 in. ferrous panel. Contract P and T 150/8233. Director General, Stores Div., G.P.O., Wellington. B.o.T. (Ref.: ESB 20255/55).*

7 Nov.—Portuguese East Africa. Tenders (A/CFB/1/1-75/55) invited for two electrical induction furnaces and complete wheel-and-axle handling plant for each, suitable for a.c. 3-phase, 50 c/s, 380 V supply. Ports, Railways and Transport Dept., Lourenco Marques. B.o.T. (Ref.: ESB 19980/55).*

10 Nov.—New Zealand. Post and Telegraph Dept., G.P.O., Wellington, invites tenders (P and T 150/8296) for considerable quantities of telephone cable, paper insulated, star quad, lead alloy sheathed, steel tape armoured and served. B.o.T. (Ref.: ESB 20948/55).*

11 Nov.—Rhodesia and Nyasaland. Supply of 20 kW medium wave transmitter at Kitwe for Federal Broadcasting Service. Details from Director, Federal Information Dept., P.O. Box 8140, Causeway, S. Rhodesia. Tender No. 2400. B.o.T. (Ref.: ESB 20825/55).*

14 Dec.—Australia. Tenders (specif. 507) invited by Queensland State Electricity Commission, Brisbane, for electric batteries and charging equipment required by Townsville Electricity Board. B.o.T. (Ref.: ESB 20800/55).*

15 Nov.—Australia. Forty-one items of multi-channel cable carrier telephone equipment required by Commonwealth Posts and Telegraphs Dept. Schedule C.7385. Documents available from Australia Hse, Strand, London, W.C.2.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, 11 October

	£ per ton	Weekly change £	Price last year £
COPPER, standard class A (settlement)	354	−11	282½
„ (3 months)	345½	−12½	265
R.S.T. (Rhodesian Selection Trust) group price*	360	—	—
LEAD, refined pig, min. 99·97% purity (cash)	106½	—	107½
„ (3 months)	106½	−½	103½
TIN, refined, min. 99·75% purity (settlement)	761	+12	732½
„ (3 months)	750	+3	732½
ALUMINIUM, ingots 99·99·5%	171	—	150
ZINC, virgin, min. 98% purity (cash)	90½	−1	83½
„ (3 months)	90½	−½	83½
RUBBER No. 1, RSS, spot (per lb.)	36½d.	−2½d.	23½d.
„ c.i.f. basis, ports, Dec. (per lb.)	35½d.	−2½d.	22½d.
ARMOURING :			
Galv. Steel Wire (0·104 in.)	56½	—	52½
Mild Steel Tape (0·04 in.)	43½	—	40½

(*Fixed price c.i.f. U.K., now subject to change at 24 hours' notice, to "consumers willing to instil a degree of stability into the resale price.")

16 Nov.—India. Supply and erection of electrically-driven vertical pumping plant with accessories at Impounding pumping stations, Kidderpore Docks. Documents at Rs 10 each from P. C. Basu, chief mechanical engineer, 8 Garden Reach Rd, Kidderpore, Calcutta.

18 Nov.—Canada. Saskatchewan Power Corporation invite tenders for estimated requirements of electrical construction material for 1956. 59 items are included in the list. Supply Manager of Corporation, 1739 Cornwall St, Regina, Saskatchewan. B.o.T. (Ref.: CRE 10508/55).*

21 Nov.—Portuguese East Africa. Supply of complete diesel engine-generator set of 100 kW capacity with control and distribution switchboards and accessories for new electrical power plants at Moamba. Tender 236/55. Ports, Railways and Transport Dept., Lourenco Marques. B.o.T. (Ref.: ESB 20003/55).*

1 Dec.—India. Manufacture, erection, etc., of one 30,000 kW M.C.R. steam turbine generator, condenser, feed heating plant, etc., for Khaperkheda power station plant extension. Specif. No. Project/5. B. V. Deshmukh, Project Officer, Madhya Pradesh Elect. Board, New Castle Building, Seminary Hills, Nagpur. B.o.T. (Ref.: ESB 20333/55).*

1 Dec.—India. Supply of equipment for extension to outdoor switchgear in Machkund hydro-electric scheme: six 132 kV bays D.D.B. type; six 132 kV disconnectors; three 11 kV structures for Delta connection; three 132 kV O.C.B. or A.C.B.s; earthing and fire protection equipment. Specif. No. A.203. Elect. Dept. of Government of Audhra, 20 Rutland Gate, Madras 6. B.o.T. (Ref.: ESB 20341/55).*

2 Dec.—Nicaragua. National Light and Power Co. of Managua require about 110 miles of transmission lines of 69 kW; 57 miles of lines of 13·2 kW; six receiving substations and electrical distribution systems for 15 towns. Enquiries should be addressed to Kuljian Corporation. 1200 North Broad St, Philadelphia 21, Pennsylvania, U.S. B.o.T. (Ref.: ESB 20346/55).*

14 Jan., 1956—India. Supply and erection of equipment for Rihand Dam power station including 5 generating units, equipment for outdoor switch yard and transformers. Chief Engineer, Electricity Dept., Uttar Pradesh, Lucknow, on payment of Rs 150. B.o.T. (Ref.: ESB 20714/55).*

14 Jan., 1956—Iraq. Supply, erection, etc., of equipment including two electrically-operated high lift and two electrical low lift pumping units for Malha water supply scheme. Director General of Municipalities, Baghdad. B.o.T. (Ref.: ESB 19879/55).*

31 Jan., 1956—New Zealand. Manufacture, supply, etc., of 150 MVA 11,000 V switchgear of duplicate busbar indoor metal-clad, draw-out type, and accessories, for Kikiwa substation. State Hydro-Electric Dept., Wellington. B.o.T. (Ref.: ESB 20950/55).*

7 Feb., 1956—New Zealand. Contract 291 calls for four single-phase auto-transformer units, each 33,333 kVA 127/63·5/11 kV, 50 cycles, outdoor type, oil immersed with (preferably) natural cooling, for Otahuhu substation. State Hydro-Electric Dept., Wellington. B.o.T. (Ref.: ESB 20988/55).*

Contracts Placed

Battersea B.C. Installations in premises in Devereux Rd, Alpha Manufacturing and Electrical Co., Ltd., £998.

C.E.A. Two 30,000 lb/hr auxiliary boilers at Marchwood, John Thompson Water Tube Boilers Ltd.; One 340,000 lb/hr boiler at Poole, International Combustion Ltd.; Two 550,000 lb/hr boilers at Staythorpe B, Babcock and Wilcox Ltd.; 275 kV, 7,500 MVA switchgear at Willington A, British Thomson-Houston Co., Ltd.; Two 60,000 kW turbo-generators, condensing and feed heating plants at Rogerstone, C. A. Parsons and Co., Ltd.; 132 kV, 2,500 MVA switchgear at Sittingbourne substation, English Electric Co., Ltd.; 132 kV, 3,500 MVA switchgear at Ellesmere Port substation, Ferguson Pailin Ltd.; 60 MVA, 132/33 kV transformer at Dickinson St, substation, Ferranti Ltd.; 132 kV overhead line between Fleet and Pyestock, Balfour Beatty and Co., Ltd.; 33 kV and multicore cables at Great Yarmouth, Pirelli-General Cable Works Ltd.; and 275 kV twin 0·4 sq in. overhead line at Willington substation, Watsham's Ltd.

Manchester T.C. Electrical installation at Kirkmanshulme Lane grammar school, Hartley Installations Ltd.

Sedgley U.D.C. Wiring in dwellings on Stickley Lane housing site, A. and V. Baxter (of Surrey), £2,482.

West Hartlepool T.C. Electrical installation in 114 three-storey flats on Owton Manor estate, Heslop and Hall Ltd.

BUSINESS PROSPECTS

Alnwick (Northumb) R.D.C. Erection of 93 houses and two shops at Shilbottle is being considered.

Co. Antrim. Construction of new primary school in Islandmagee Rd, Whitehead. Ferris, Craig and Moore, quantity surveyor, 41 University Rd, Belfast.

Bath. Approval granted for erection of domestic science training college, secondary modern school in Kelston Rd, and R.C. secondary modern school south of Wansdyke, during 1956-57.

Bedford T.C. It is proposed to erect 10-storey flats and bungalows at St. John's Glebe.

Blairgowrie and Rattray (Perth) T.C. Revised layout approved for erection of 54 houses in Hope Park scheme.

Brigg U.D.C. It is proposed to erect 44 houses and four shops on Woodbine estate.

Bristol. Architects for factory proposed by Schweppes Ltd. on Brislington estate are D. Hamilton, Wakeford and Partners, 7 Connaught Place, Hyde Park, London, W.2.

Burnley T.C. Erection of 74 houses and ten shop fronts on Far Brunshaw estate. Borough Engineer and Surveyor, 22-24 Nicholas St.

Carlton (Notts) U.D.C. Erection of 34 houses in Grange Crescent site. Engineer and Surveyor, Council Hse, Burton Rd.

Cheshire. Ministry approval received for 1956-57 school building programme, which includes two primary, and seven secondary schools, Carlett Park College of Further Education, second installment. Cost estimated at £1,250,000.

Cockermouth (Cumb). Fifty-four houses to be built on Park Lane estate by N.E. Housing Assoc., Curzon Hse, Maryport.

Cookham (Berks) R.D.C. Construction of two blocks of 6 flats and 37 houses in blocks at Shepherd's Close, Hurley. A. Mandeville, Engineer and Surveyor, Council Offices, Oaklands, 1 Bath Rd, Maidenhead.

Croydon. Realm Engineering Works Ltd., 267 Whitehorse Lane, South Norwood, propose factory in Milton Ave. Sketch plans by Anderson, Forster and Wilcox, 9 Stone Buildings, Lincoln's Inn, London, W.C.2.

Darlington. It is hoped to begin work next year on second instalment of College of Further Education.

Derbyshire. Plans submitted by Nestle's Co., Ltd., of Hayes, Middlesex, for large factory at Mickleover.

Eire. Sligo Spinning Co., Ltd., to build factory. Details from T. C. Whelan, National Bank Chambers, Cavendish Row, Dublin.

Exeter. Application will probably be made to borrow £82,663 for erection of Whipton Barton junior mixed school.

Glasgow. Single-storey factory and 2-storey office block to be built on corner of Finnieston and Tunnel Sts by Reid, Parker and Co., of 159 Finnieston St, C3.

Glastonbury. New secondary modern school to be built in district.

Gourock (Renfrew). Plans approved by Dean of Guild Court for old peoples' home in Kirn Drive, to cost about £34,000.

Haverhill. Polak and Schwartz (England) Ltd. propose to erect factory. Architect is E. D. Mills, 16 Carlisle St, London, W.1.

Hexham U.D.C. Plans approved for additions to Queen Elizabeth grammar school.

Hull. United Brass and Copper Works Ltd., 25 Osborne St, to erect new works and offices in Waverley St.

Jarrow (Dur) T.C. Approval sought for erection of 72 houses in Queens Rd area.

Kettering T.C. Fifty-three flats to be built on Windmill Ave estate.

Kilmarnock. Dean of Guild Court has approved plans for erection of three shops costing £7,000 on Bellfield estate.

Leamington Spa T.C. It is proposed to erect 13 shops, 9 maisonnettes and four flats in Crown Way, Lillington.

Leeds. Porterprint Ltd., Easy Rd, to build new factory at Hunslet.

Macclesfield. New wool spinning mill to be built in Hulley Rd for Rochdale Carpet Co., Ltd. Architect is R. B. Turner, 180 Oxford Rd, Manchester.

Maidstone T.C. Erection of 72 flats in five blocks on Shepway estate. Borough Surveyor, Palace Ave. Also, new office block in Cornwallis Rd proposed by Clarke and Epps Ltd.

Market Harborough U.D.C. It is proposed to erect 30 houses and a shopping centre on the Southern estate.

Middlesbrough. Plans approved for additions to Acklam Hall secondary school costing about £66,000; architects are Needham, Thorp and White, High Petergate, York. Additions to Kirby grammar school costing about £75,000 also approved, Gray and Partner, Camden St, North Shields, are architects. Plans in hand for erection of five secondary schools at Prissick Farm, Marton.

Newcastle-on-Tyne T.C. Erection of 75 houses on Kenton North estate. City Architect, 18 Cloth Market.

Construction of Firfield secondary modern boys' school at Blakelaw. H. V. Lightfoot, director of education, City Education Office, Northumberland Rd.

Nottingham. F. M. Goodlud and Co., Ltd., 21 St. Mary's Gate, propose to erect factory and offices at junction of Hollow Stone and Plumptre St.

Pendlebury. Extensions to be carried out at Clifton Junction works of Pilkington Tiles Ltd. Cost is estimated at £200,000.

Plymouth. T.C. recommended to approve scheme for erection of repertory theatre in Barbican area. Other schemes in hand at moment include second instalment of Plymouth and Devonport Technical College (£268,500); block of five shops and 10 maisonnettes in George St, Devonport; and 34 shops and 42 flats in Cornwall St. Approval granted for erection of Widey technical secondary, Austin Farm primary, Bull Point secondary modern and Southway Lane secondary modern schools during 1956-57. Cost estimated at £360,000.

Prestwick T.C. Improvement and development of the Esplanade approved. It includes two-storey restaurant, shops, etc., and will cost about £70,000.

Renfrew T.C. Approval given for construction of 70 houses at Kirklandneuk for Scottish Special Housing Assoc.

Rochdale. Factory at Fieldhouse Mill proposed by John Bright and Bros., Ltd.

Scunthorpe T.C. Schemes in hand for erection of 90 houses costing about £137,133 on Riddings estate, and 5 shops, 6 houses and 4 garages estimated to cost £17,460 in Everest Rd. Also, Gloucester Ave is site for erection of 16 bungalows for old people.

Slough T.C. Construction of 130 dwellings in Cippenham Lane. E. Gardner Thorp, Borough Engineer, Town Hall.

Somerset. It is proposed by Bridgwater, Minehead and Butleigh Hospital Management Committee to erect physiotherapy dept. and nurse training unit at Bridgwater, and casualty dept. at Minehead.

South Shields. Next year's building programme will include infants' school in Highfield Rd, and final instalment of Mortimer county secondary school at Brinkburn. It is also proposed eventually to build nursery schools in Summerhill Rd, Bamburgh Grove, Westmorland Rd and Grotto Rd.

Southall T.C. Amended scheme for Golf Links estate comprises total of 312 maisonnettes, 44 flats, 78 houses and 14 old persons' dwellings.

Southampton T.C. Erection of 304 dwellings in Hogsland development scheme. Borough Engineer, Civic Centre.

Stoke-on-Trent. Revised plans for offices, alterations to buildings and factory additions submitted to T.C. by W. Podmore and Sons Ltd. Development to be carried out in Caledonia Rd, Shelton.

Sunderland. Approval received for proposed secondary modern school at Farringdon, but work will not begin until Jan. 1957.

Thornbury (Glos) R.D.C. Plan approved for development of Thornbury Castle estate providing for 115 houses.

Wallsend (Northumb). Preliminary plans prepared for £51,000 R.C. infants' school at Willington Quay. Architect is R. Burke, Lambton Hse, Lambton Rd, Newcastle.

Whitley Bay. £50,000 garage and showroom proposed at Cullercoats by George Davidson and Sons Ltd. Architect is L. G. Wood, 17 Northumberland Sq, North Shields.

Whittlesey (Cambs). Reuben Rose (Properties) Ltd. planning private estate of 165 dwellings and shops in New Rd.

Trade Notes

Changes of Address. The London Office of Lumenated Ceilings Ltd. has now moved to Alliance House, Caxton St, S.W.1. Telephone: Abbey 7113.

Serck Radiators Ltd. and Serck Tubes Ltd. have together opened new offices at 16 Berkeley St, London, W.1 (Telephone Mayfair 9744). Lieut. Cdr (E.), A. W. M. Collyer, R.N. (Retd.) represents the Engineering Division of the group.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.

H. and V. Electrical Co. (Bognor) Ltd. 3 The Parade, Pagham, Sussex. Electrical engineers and contractors, etc. Nom. cap.: £1,500. Dirs.: R. T. Vincent and Mrs F. E. Vincent.

Servico (Manchester) Ltd. 110 Claremont Rd, Moss Side, Manchester. Manufacturers of and dealers in dynamos, motors, etc. Nom. cap.: £3,000. Dirs.: A. Fleming and Mrs. V. Fleming.

Square "D" Ltd. 5 Bishopgate, E.C.2. Electrical and electronic engineers, etc. Nom. cap.: £100. Dirs.: not named. Subs.: J. L. Newcombe and F. C. S. Tufton, 5 Bishopsgate, E.C.2.

Thomas Carey and Son Ltd. Station Bldgs., East Finchley, N.2. Civil, mechanical, electrical and general engineers, etc. Nom. cap.: £3,000. Dirs.: T. Carey and M. J. O'Donnell.

MEETINGS TO NOTE

THURSDAY, 13 OCT.

INCORP. PLANT ENGINEERS (Glasgow). "Hermetically sealed Refrigerating Equipment." A. K. Alcock. Building Centre, 425 Sauchiehall St, 7 p.m.

I.E.E. (London Utilisation). Chairman's address by D. B. Hogg. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (N. Scotland). "Electrical Energy from Wind." E. W. Golding. Queen's College, Dundee, 7 p.m.

I.E.E. (Swansea). Chairman's address by J. H. Groocock. Elect. Offices, The Kingsway, 6 p.m.

FRIDAY, 14 OCT.

INST. OF FUEL (Scottish). "Development of Slurry Handling Plant at Barony Power Station." J. R. Croucher. Royal Technical College, Glasgow, 7 p.m.

E.P.E.A. (Southern Meter Engrs.). "Some Impressions of America." L. H. Welch. Caxton Hall, S.W.1, 6.30 p.m.

A.S.E.E. (Stoke). "Metal Rectifiers." N. Stafford Hotel, 8 p.m.

A.S.E.E. (Bristol). Meeting at York Hse Hotel, Bath, 7.30 p.m.

MANCHESTER ASSOC. OF ENGINEERS. President's address by C. A. Sparkes. Engineers' Club, Albert Sq, 6.30 p.m.

MONDAY, 17 OCT.

BIRMINGHAM ELECTRIC CLUB. "The Proton Synchrotron." J. L. Symonds. Grand Hotel, 6.15 p.m.

IPSWICH ELECTRICAL ASSOC. "Factory Lay-out and Mechanical Handling." L. Landon Goodman. Electric Hse, 7.15 p.m.

I.E.E. (London). Discussion on "Railway Signalling." J. H. Fraser. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Mersey and N. Wales). "High-Speed Electronic-Analogue Computing Techniques." D. M. MacKay. Liverpool Royal Instn., Colquitt St, 6.30 p.m.

I.E.E. (N.E. Radio and Measurements). Chairman's address by C. H. W. Lackey. King's College, Newcastle, 6.15 p.m.

I.E.E. (Western Supply). Chairman's address by E. K. Wood. S. Wales Inst. of Engineers, Park Place, Cardiff, 6 p.m.

I.E.E. (Reading). "Electrical Industry—Career Opportunities and Training Schemes." A. G. Beverstock. George Hotel, 7.15 p.m.

TUESDAY, 18 OCT.

I.E.S. (Liverpool). Chairman's address by G. L. Butler. Engineering Soc., 9 The Temple, Dale St, 6 p.m.

I.E.E. (London Education). Discussion on "Analogues and Equivalent Circuits." W. A. Turner. Savoy Place, W.C.2, 6 p.m.

I.E.E. (N. Midland Utilization). "Design, Performance and Application of Miniature Circuit-Breakers." Elect. Offices, 1 Whitehall Rd, Leeds, 6.30 p.m.

I.E.E. (N. W. Supply). "Supply of Electricity in London Area." D. B. Irving. Engineers' Club, Albert Sq, Manchester, 6.15 p.m.

I.E.E. (S.E. Scotland). "Thermionic Valves of Improved Quality for Govt. and Industrial Purposes." E. G. Rowe, P. Welch and W. W. Wright. Heriot-Watt College, Edinburgh, 7 p.m.

I.E.E. (London Students). Chairman's address: "A. C. Switchgear." M. H. F. Collins. R.E.M.E. Training Centre, Arborfield, Berks, 7 p.m.

A.S.E.E. (Portsmouth) "Electrical Engineering in Persia." S. H. Allen. "Air Balloon." 598 Commercial Rd, Mile End, 7.30 p.m.

A.S.E.E. (London). Presidential Address: "Hydro-Electric Developments in North Scotland." Bryan Donkin. Presentation of Assoc. awards. I.E.E., Savoy Place, W.C.2, 6.30 p.m.

WEDNESDAY, 19 OCT.

I.E.S. (Glos and Cheltenham). "Home Lighting." Mrs Jean L. Stewart. Fleece Hotel, Westgate St, Gloucester, 6.30 p.m.

I.E.S. (N. Lancs). Members' Night. Elec. Offices. 19 Friargate, Preston, 7.15 p.m.

I.E.S. (Tees-side). "Application and Maintenance of Discharge Lamp Installations." J. J. French. Cleveland Inst., Corporation Rd, Middlesbrough, 6.30 p.m.

INCORP. PLANT ENGINEERS. (Kent). Selection of Electric Motors for Industrial Purposes." J. M. Peel. Bull Hotel, Rochester, 7 p.m.

I.E.E. (London Radio and Telecommunications). Chairman's address by H. Stanesby. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Sheffield). Chairman's address by W. Newcastle. Grand Hotel, 6.30 p.m.

I.E.E. (Southern). "Transatlantic Telephone Cable." M. J. Kelly, Sir Gordon Radley, G. W. Gilman and R. J. Halsey. University, Southampton, 7.30 p.m.

I.E.E. (Hatfield). General discussion meeting. Technical College, 7 p.m.

A.S.E.E. (Nottingham). "A.C. Polyphase Shunt Characteristic Commutator Motors." A. C. Lane. Elect. Offices, 7.30 p.m.

NORFOLK ELECT. SOCIAL COMMITTEE. Dinner arranged on behalf of Norwich E.C.A., at Assembly House, Norwich.

THURSDAY, 20 OCT.

I.E.S. (Manchester). Conversazione on Light at College of Technology, Sackville St, —until 22 Oct.

INCORP. PLANT ENGINEERS. (Blackburn). "Repair of Fractured Castings." N. Tinwell. Golden Lion Hotel, 7.30 p.m.

I.E.E. (N. Midland). "Radio Aids to Marine Navigation." Capt. R. G. Swallow, R.N. Ret'd. Elect. Offices, Ferensway, Hull, 7.15 p.m.

I.E.E. (S. Western). Chairman's address by W. J. Guscott. Royal Clarence Hotel, Exeter, 3 p.m.

I.E.E. (Irish). Chairman's address by A. J. Litton. Physical Lab., Trinity College, Dublin, 6 p.m.

CHELMSFORD ENGINEERING SOC. "Lighting of Public Thoroughfares." W. F. S. Debenham. Crompton's Social Hall, 7.30 p.m.

A.S.E.E. (Kent). "Sunvic Controls." Miss J. M. Clapperton. Rose and Crown Hotel, Tonbridge, 8 p.m.

A.S.E.E. (Watford). "Electronics." Clarendon Hotel, Station Rd, 8.15 p.m.

FRIDAY, 21 OCT.

BIRMINGHAM ELECTRIC CLUB. Annual dinner at Grand Hotel, 6.30 p.m.

E.I.B.A. (Essex). Annual Ball at Queens Hotel, Westcliff, 6.30 p.m.

I.E.E. (London Students). Autumn dance at Victoria Halls, Bloomsbury Sq, W.C.1, 7.30 p.m.

SATURDAY, 22 OCT.

A.S.E.E. (Oxford and Reading). "Water Heating." A. Hughes. Y.M.C.A., 10 George St, Oxford, 6.30 p.m.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Alkathene. 742,992. Class 11. All goods, Imperial Chemical Industries Ltd., Imperial Chemical Hse, Millbank, S.W.1.

Belclere. 742,775. Class 9. Electrical apparatus, etc. Savory and Moore Ltd., 61 Welbeck St, W.1.

Fantom. 741,496. Class 7. Fractional h.p. motors. English Electric Co., Ltd., Queens Hse, Kingsway, W.C.2.

Magco. 743,396. Class 7. Vibrating conveyors for moving and sifting granular materials. Magnetic Equipment Co., Ltd., Lake Works, Wicor, Portchester, Hants.

Tack-Air. 741,894. Class 11. Air conditioning installations, etc. Tack Air Conditioning Ltd., 1/5 Longmoore St, S.W.1.

Tamalyser. 744,481. Class 9. Measuring, indicating and recording instruments, etc. Television Audience Measurement Ltd., Chantry Hse, Eccleston St, S.W.1.

Translite. 742,992. Class 11. Lamps, lighting, fittings, etc. Thorn Electrical Industries Ltd., 105/109 Judd St, W.C.1.

Trifi in design. 741,981, Class 9. Radio and television receivers, etc. Kolster-Brandes Ltd., Cray Works, Sidcup, Kent.

Gazette Announcements

COMPANIES ACTS

F. J. Coleman (Electrical Contractors) Ltd. Resolution for voluntary winding-up passed at meeting on 29 Sept., when N. W. Osborne, C.A., 11-12 Finsbury Sq, London, E.C.2, was appointed liquidator.

Duralectrics Ltd. Resolution for voluntary winding-up passed at meeting on 1 Oct., when F. L. Moulding, C.A., 8 Paradise Sq, Sheffield, was appointed liquidator.

A. S. Wooton and Co., Ltd. Resolution for winding-up passed at meeting on 25 Aug. A. T. Eaves, of 47 Mosley St, Manchester 2, has been appointed liquidator, and creditors are asked to send particulars to him by 4 Nov.

BANKRUPTCY ACTS

Receiving Order

Bristol. Enfield W. White, electrical contractor of 5 Greenfield Rd, Southmead. Date of receiving order, 4 Oct.

First Meetings

Bradford. Sam Shaw, electrical contractor of 133 Leeds Rd, Bradford. First meeting will be tomorrow (14 Oct.) at Official Receiver's Office, 20 North Parade, Bradford, at 11 a.m., and public examination at County Court, Manor Rd, Bradford, on 9 Nov., at 10.30 a.m. Receiving order dated 1 Oct.

Reading. M. S. Harris, electrical engineer of Four Winds, Beech Rd, Purley. First meeting at 58-61 York Terr., Regent's Park, London, N.W.1, on 18 Oct., at 11.30 a.m. Public examination will be at Assize Court, Forbury, Reading, at 2.15 p.m. on 8 Dec.

Southend. E. Newland, electrical contractor of 130 Grove Rd, Chadwell Heath, Romford. Meeting will be at 11 a.m. on 18 Oct. at 58-61 York Terr, Regent's Park, N.W.1, and public examination at 102 Alexandra Rd, Southend, on 8 Dec., at 11 a.m.

Applications for Discharge

London. Julius Hiller, electrical retailer trading at 52 Whitechapel Rd, E.1. Hearing fixed for 11 a.m. on 16 Nov. at Bankruptcy Buildings, Carey St, W.C.2.

Gloucester. Walter E. Sparrow and Florence Sparrow, trading as Sparrow and Co., electrical contractors, at 8 Longsmith St. Separate estate of W. E. Sparrow. Hearing fixed for 17 Nov. at The Shire Hall, 11.15 a.m.

Orders Annulled, Revoked, etc.

Leeds. Donald Cunningham and Arthur E. Beacock, trading as Home Electrical Maintenance Co., at 39-40 Trevelyan Chambers, Boar Lane, Leeds. Receiving order dated 15 Jan., 1936, rescinded, and Order of Adjudication of same date, annulled, by order dated 12 Sept., 1955, so far as refers to estate of D. Cunningham. Debts paid in full.

This
vital
link
TRANSATLANTIC TELEPHONE PROJECT
Part of the consignment of the Newfoundland Land Cable being supplied to the British Post Office by W T Henley's Telegraph Works Co. Ltd in conjunction with their Associated Company Southern United Telephone Cables Ltd.
HENLEY CABLES

by HENLEY

Crossing Newfoundland from Clarenville to Terrenceville, Henley's have supplied over 45 miles of land cable and over 9 miles of more heavily armoured cable for use under water, as part of the Transatlantic Telephone project.

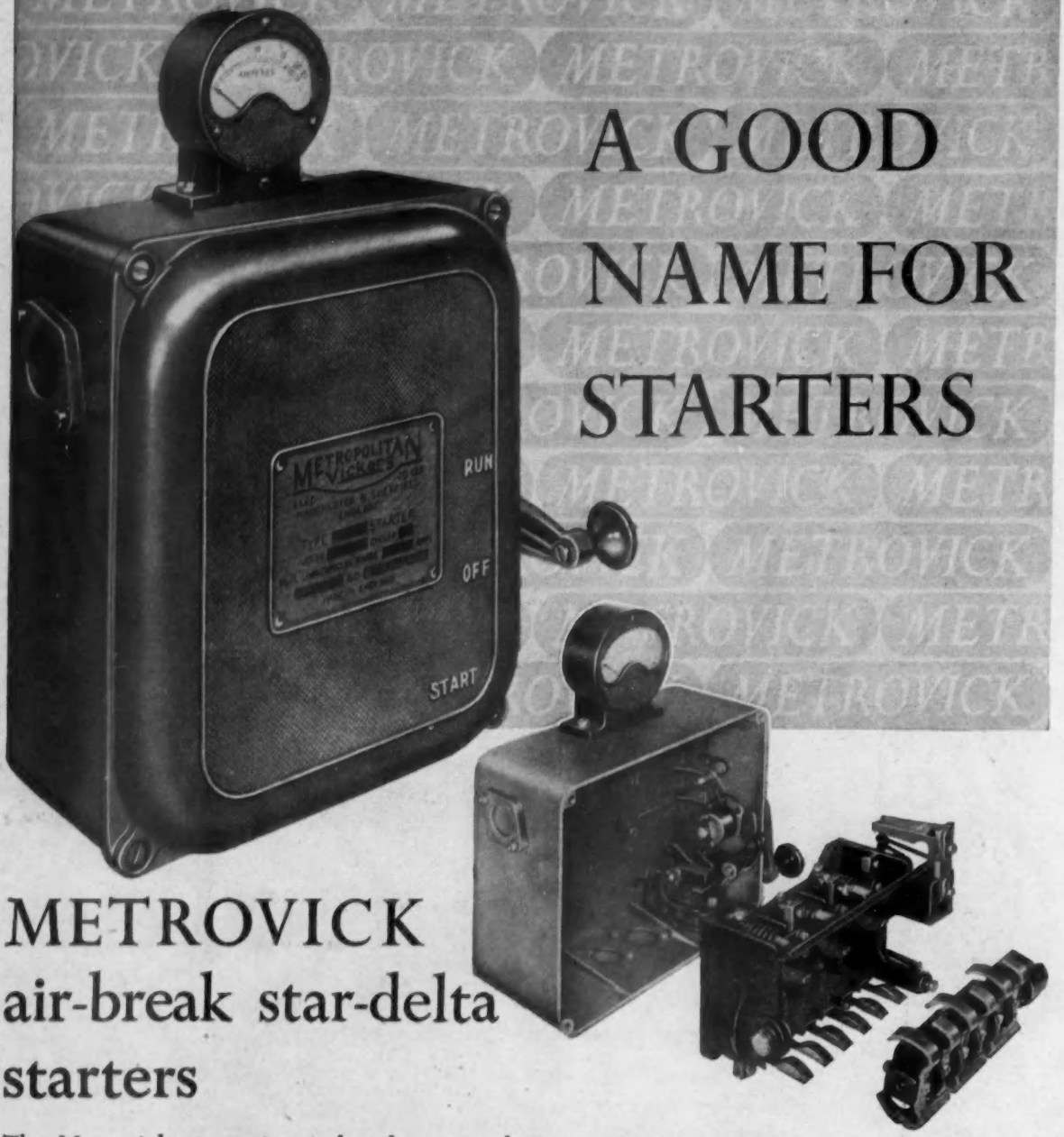
This cable provides facilities for 36 simultaneous conversations and connects with the submarine cables between Great Britain and Newfoundland, and Newfoundland and Nova Scotia.

The illustration shows part of the consignment of 93 drums of the Newfoundland land cable being supplied to the British Post Office by Henley's, in conjunction with their Associated Company, Southern United Telephone Cables Ltd.

BY APPOINTMENT TO HER MAJESTY THE QUEEN ELECTRIC CABLE MANUFACTURERS

W T HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

A GOOD NAME FOR STARTERS



METROVICK air-break star-delta starters

The Metrovick reputation is based on sound engineering design and good workmanship. The standard is maintained in the type ASD series of starters which conform with BSS.587. They are suitable for squirrel cage motors up to 25 H.P. 650 volts and are available for immediate delivery. Write for full technical details.

Type ASD starters are intended for use in general industrial applications.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER 17

Member of the A.E.I. group of companies

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CLASSIFIED ADVERTISEMENTS

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 32s. 6d. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

TENDERS INVITED

SKIPTON URBAN DISTRICT COUNCIL

TRUNK ROAD LIGHTING

TENDERS are invited for:

(*a*) The supply and delivery of 157 No. sets of lighting equipment for 400 W mercury vapour discharge lighting, consisting of lanterns, lamps, control gear and time switches, and

(*b*) The supply and delivery of 157 No. steel columns and arms with erection, fitting of the lighting equipment, and bringing the system into service.

Forms of tender, specifications and Bills of Quantities may be obtained from K. B. Robinson, Esq., Engineer and Surveyor, Town Hall, Skipton, on receipt of deposit of one guinea and must be returned to the undersigned, in envelope provided, not later than Monday, 7 Nov., 1955.

Contract drawings may be inspected at the office of the Engineer and Surveyor.

The Council does not bind itself to accept the lowest or any tender, and reserves the right to accept the whole or part only of any tender.

L. E. SMITH,
Clerk to the Council.
(V 461)

BOROUGH OF LUDLOW

SODIUM DISCHARGE STREET LIGHTING

TENDERS are invited for the supply, erection and putting into service of 53 sodium lighting units of 140 W rating on the major part of the Newport-Shrewsbury Trunk Rd A.49 lying within the borough.

Documents may be obtained from, and drawings inspected at, the offices of the Borough Surveyor at the address below, and completed Tenders, in plain sealed envelopes endorsed "Street Lighting" must be returned to me not later than 5 Nov., 1955.

The Council does not bind itself to accept the lowest or any tender, and any provisionally accepted tender will be subject to the approval of the Minister of Transport.

J. P. MOLONY,
Town Clerk.

Municipal Offices,
Ludlow, Shropshire.
(V 481)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

GLASCARNOCH-LUICHART-TORR ACHILTY PROJECT ELECTRIC LIGHTING, HEATING AND AUXILIARY CABLING AT MEIG DAM

TENDERS are invited for the above installation. Copies of the Tender Document may be obtained on application, with a cheque for £2. 2s. (returnable), to the Engineers, Messrs Merz and McLellan, 72a George St, Edinburgh 2. The Board do not bind themselves to accept the lowest or any Tender. H. W. Simpson, Secretary, 16 Rothesay Terr, Edinburgh 3. (V 472)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

EASTHAMPSTEAD RURAL DISTRICT COUNCIL

ELECTRICAL STREET LIGHTING INSTALLATIONS

TENDERS are shortly to be invited from Firms of Street Lighting Contractors for the provision and erection of approximately

4 No. Group "A," and
300 No. Group "B"

electrical street lighting units in this district.

Firms wishing to receive Specifications and Forms of Tender and to see plans of the proposals which will be on deposit at these offices, should in the first instance submit their names and a deposit of two guineas (returnable where a bona fide tender, not subsequently withdrawn, is duly received).

The closing date for the receipt of tenders will be 12 Dec., 1955.

H. CHARLESWORTH,
Engineer and Surveyor.

Council Offices,
Church Road,
Bracknell, Berks. (V 451)

BOROUGH OF REIGATE

CLASS A STREET LIGHTING SCHEME

TENDERS are invited for supply and erection of street lighting equipment on the A.23 Trunk Rd, Frenches Rd—Fairhaven Rd. Specification and details from Borough Surveyor, Town Hall, Reigate. Sealed Tenders endorsed "Street Lighting" to undersigned by Monday, 31 Oct., 1955.

The Council does not bind itself to accept the lowest or any Tender.

HEBER DAVIES,
Town Clerk.

Town Hall,
Reigate. (V 460)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

CENTRAL ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following post at Ipswich Generating Station:

STATION SHIFT CONTROL ENGINEER

Salary Class D, Grade 10, £555 x £15—£600 per annum.

Applicants should have reached the standard of Ordinary National Certificate in Electrical Engineering, or its equivalent, have experience in the operation of a switchboard at a Generating Station and be fully conversant with High Voltage Switching operations and protective systems.

Applications stating age, details of experience and qualifications should be sent to the Controller, Central Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than 22 Oct., 1955.

W. N. C. CLINCH,
Controller.
(V 463)

THE NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

Area Board Headquarters

CHIEF DRAUGHTSMAN, Chief Engineer's Department, Carliol House, Newcastle upon Tyne.

Applicants must have had extensive experience of Drawing Office work, preferably in association with the Electricity Supply Industry and be conversant with up-to-date Drawing Office practice and organisation.

Salary—Schedule D, Grade 1—£1,075/£1,225. N.J.B. conditions of service.

Wear Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER, Crook District.

Applicants must be qualified electrical engineers with sound practical training and experience in construction, operation and maintenance of overhead and underground networks and associated plant and equipment.

Salary—Schedule A, Class D, Grade 7, £675/£720. N.J.B. conditions of service.

Applications stating age, qualifications and experience, to be received by the Secretary (Establishments), The North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne, within ten days of the appearance of this advertisement. (V 493)

CENTRAL ELECTRICITY AUTHORITY
Midlands Division

FOURTH ASSISTANT ENGINEER is required in the Protective Gear Section of the Technical Department. N.J.B. service conditions, superannuable appointment, salary within Schedule C, Grade 6, commencing in range £600/£725, ultimately rising to £785 per annum.

A university degree, Higher National Certificate or equivalent qualification is desirable. Some knowledge of protective gear is required, and preferably experience with a switchgear manufacturer.

Apply on form AE6, quoting vacancy No. 100MD, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 29 Oct., 1955. (V 495)

BRITISH STANDARDS INSTITUTION

AN ELECTRICAL ENGINEER is required by the British Standards Institution for work in connection with the approval of all types of electrical equipment for export to Canada. Applicant should have served an apprenticeship and have technical qualifications equivalent at least to graduate membership of I.E.E.

Salary range is £600/£1,000 dependent on age, qualifications and experience. Apply Establishment Officer, British Standards Institution, 2 Park St, London, W.1. (V 491)

LONDON ELECTRICITY BOARD

STRUCTURAL ASSISTANTS AND STRUCTURAL DRAUGHTSMEN

APPLICATIONS are invited for the above positions in the Construction Branch of the Chief Engineer's Department in Central London.

Applicants for the positions of Structural Assistants in the Civil Engineer's Section should be experienced in the design and detailing of reinforced concrete, and/or steel framed superstructures and foundations.

Applicants for the positions of Structural Draughtsmen should have a knowledge of building construction requirements and/or some experience in detailing reinforced concrete or steel structures.

The posts are graded under Schedule D, National Joint Board Agreement, as Grade 5—£672/£777 and Grade 6—£535, 10s./£661, 10s. per annum respectively, inclusive of London Allowance. Commencing salaries will be dependent on qualifications and experience.

Application forms obtainable from Personnel Officer, 46/7 New Broad St, London, E.C.2, to be returned completed by 25 Oct., 1955. Please enclose addressed envelope and quote ref.: V/2003/T. (V 396)

CENTRAL ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. for posts (*a*) and Corporate Membership for posts (*b*) an advantage.

(*b*) SHIFT CHARGE ENGINEER
BARKING C GENERATING STATION
Vacancy No. 55/791

Practical experience in operation of power station plant essential. Character and ability to deal with Staff problems essential. Salary—Class J, Grade 7=£945 per annum.

(*a*) ASSISTANT ENGINEER (SHIFT) (3·3 kV CONTROL BOARD)
BATTERSEA GENERATING STATION
Vacancy No. 55/792

Sound engineering training followed by some experience in a modern power station. Salary—Class L, Grade 15=£666. 15s. per annum.

(*a*) SHIFT CHARGE ENGINEER
BECKENHAM GENERATING STATION
Vacancy No. 55/793

Practical experience necessary in efficient operation of power station plant. Salary—Class B, Grade 7=£624. 15s. per annum.

(*a*) ASSISTANT SHIFT CHARGE ENGINEER
ST. MARYLEBONE GENERATING STATION
Vacancy No. 55/794

Sound technical training necessary with practical experience in power station operation. Salary—Class E, Grade 9=£666. 15s. per annum.

(*b*) OPERATION AND EFFICIENCY ENGINEER
STEPNEY GENERATING STATION
Vacancy No. 55/795

Applicants should have a wide knowledge of power station operation and be able to investigate for the purpose of improving efficiency. The post will also cover arrangements regarding shipping and coal supplies. Salary—Class F, Grade 5=£882 per annum.

(*b*) MAINTENANCE ENGINEER (ELECTRICAL)
WEST HAM GENERATING STATION
Vacancy No. 55/796

Candidates should have had workshop training with wide general experience of power station electrical equipment and practical experience of E.H.T. switchgear and protective gear. Salary—Class H, Grade 7=£882 per annum.

(*a*) STATION SHIFT CONTROL ENGINEER
WEST HAM GENERATING STATION
Vacancy No. 55/797

Applicants should have a sound technical training and practical experience in the control and operation of steam generating plant and main switchgear in modern power station. Salary—Class H, Grade 10=£750. 15s. per annum.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, Central Electricity Authority, London Division, P.O. Box 136, Generation House, Great Portland St, W.1, and be received within 14 days of this advertisement. (V 468)

CENTRAL ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 109/55

APPLICATIONS are invited for superannuable N.J.B. appointments in the Drawing Office, Construction Department, Divisional Headquarters.

(*a*) ENGINEERING DRAUGHTSMAN (ELECTRICAL).

(*b*) ENGINEERING DRAUGHTSMAN (MECHANICAL).

Salary: Schedule D, Grade 6, £510/£630 per annum.

Candidates should be suitably trained, possess an Ordinary or Higher National Certificate and be experienced in one or more classes of plant or equipment usually installed in Power Stations.

Application forms obtainable from Secretary, South Wales Division, Central Electricity Authority, Twyn-y-fedwen Rd, Gabalfa, Cardiff, to be returned by 28 Oct., 1955. (V 488)

THE EAST MIDLANDS ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER—CHESTERFIELD DISTRICT

APPLICATIONS are invited for the above post in the Chesterfield District.

Candidates must have received a sound engineering training and be thoroughly experienced in the application and use of electricity for Industrial, Commercial and Domestic purposes, and the changeover of consumers from non-standard to standard supplies. The possession of the Higher National Certificate in Electrical Engineering or similar qualification would be an advantage.

The successful candidate will be required to live in or near Chesterfield and will be responsible to the District Comercial Engineer for the general supervision of the Commercial Section, and to organise and control a changeover section, for the conversion of a 30 cycle system to a 50 cycle system, and for a 3-wire direct current system to a standard alternating current system.

The salary will be accordance with Class F, Grade 6, of the National Joint Board Agreement commencing at £790 per annum.

Applications stating age, qualifications, experience and present position should be forwarded to the Manager, Chesterfield District, 172 Chatsworth Rd, Chesterfield, within 14 days of this advertisement. (V 466)

CENTRAL ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following post:

SHIFT CHARGE ENGINEER
EARLEY GENERATING STATION, READING
S/13,746

Applicants should possess technical qualifications admitting to corporate membership of a recognised professional institution, and have had previous operating experience involving responsibility in a large modern generating station with high temperatures and pressures and preferably with pulverised fuel equipment.

Salary N.J.B. Grade G.7, £790/£850.

Special application forms obtainable from P. D. A. Oliver, Divisional Secretary, 111 High St, Portsmouth, should be returned by 26 Oct., 1955. Please quote reference E.T. (V 502)

COLLEGE OF TECHNOLOGY, BIRMINGHAM

Department of Electrical Engineering

APPLICATIONS are invited for the following posts:

(*a*) ASSISTANT GRADE "B"

The person appointed will be required to take up duty as soon as possible. Applicants should hold a degree in Electrical Engineering or its equivalent and should have had practical experience in an Electrical Engineering capacity.

Salary will be in accordance with the Burnham (Further Education) Scale for Grade B Assistants (Men) £525 x £25 (final increment £20)—£820, (Women) £475 x £20—£655 (plus equal pay increment) with additional graduate and training allowances where applicable. In fixing the commencing salary, account will be taken of teaching and industrial experience.

(*b*) RESEARCH ASSISTANT

Candidates must have a good honours degree in Electrical Engineering, and preferably should be graduates of a University which awards higher degrees for external study.

Salary will be in accordance with the Burnham (Further Education) Scale for Grade A Assistants. Basic salary (Men) £510 with increments for approved training and industrial or teaching experience.

Further particulars and form of application may be obtained from the Registrar, College of Technology, Suffolk St, Birmingham 1, on receipt of stamped addressed foolscap envelope. Completed forms should be returned to him not later than two weeks after the insertion of the advertisement.

K. R. PILLING,
Clerk to the Governing Body.
(V 485)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

ASSISTANT MAINTENANCE ENGINEER—MECHANICAL

ABERDEEN STEAM POWER STATION

APPLICATIONS are invited from qualified engineers for the above vacancy and should be submitted with full details of age, education, practical training and technical qualifications by 24 Oct., 1955, on a Form for Employment obtainable from the undersigned.

The salary is in accordance with the N.J.B. Scale, Grade F.8 (£715 x £15—£760), and the post is superannuable.

J. E. WHITTAKER,
Area Manager.

Area Offices,
Millburn St,
Aberdeen. (V 492)

WAR DEPARTMENT

requires CIVILIAN POWER STATION SUPERINTENDENT (TECHNICAL GRADE I) in Gibraltar. Appointment for 3 years in first instance with possibility of extension. Starting pay according to age, qualifications and experience on range, with increased pay supplement, £850/£1,045 per annum. Foreign Service, Outfit and Trunk tax free allowances payable. Accommodation normally provided for single or married man while unaccompanied. Successful married applicant must proceed unaccompanied but may apply on arrival, when he has found approved accommodation, for family passage at public expense. Duties: superintending operation and maintenance of electrical supply undertaking comprising three 980 kW Fullagar diesel generating sets, one 750/1,000 kW gas turbine generating set, auxiliary equipment including air-blast cooling chamber for diesel sets, 6·6 kV switchgear and HV distribution system (double ring main, broken down to LV at 14 substations). Preference given to candidates not over 50 years with Higher National Certificate in electrical and/or mechanical engineering or equivalent qualification, but those with thorough experience of comparable installation would be considered. Application forms from M.L.N.S., Technical and Scientific Register (K), 26 King St, London, S.W.1, quoting D.105/5A. (V 473)

CENTRAL ELECTRICITY AUTHORITY

Midlands Division

SHIFT CHARGE ENGINEER is required at Wolverhampton Power Station. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade E.7, £715/£760 per annum, plus £50 (load control duties).

A sound technical training and practical experience in the operation and maintenance of steam generating plant and main switchgear are required. Appropriate technical qualifications will be an advantage.

Apply, quoting Vacancy No. 101MD on form AE6, available from Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 24 Oct., 1955. (V 496)

SOUTH OF SCOTLAND ELECTRICITY BOARD

PORTOBELLO POWER STATION

APPLICATIONS are invited for the post of ASSISTANT MAINTENANCE ENGINEER (Electrical) at Portobello Power Station.

Training in Electrical Engineering up to Graduate I.E.E. standard is necessary and a good knowledge of mechanical engineering in relation to control instruments is desirable. Principal duties will be the maintenance of automatic combustion control gear working on a combined pneumatic-electrical principle associated with modern high pressure boiler plant.

Salary will be in accordance with N.J.B. Schedule A, Class J, Grade 8, £840/£900.

The position is superannuable. Application should be made on the standard application form which may be obtained from the undersigned at 351 Sauchiehall St, Glasgow, C.2, and returned not later than 28 Oct., 1955.

J. MEEK,
Secretary.
(V 503)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SECTION ENGINEER required in the Oswestry District of the Board's No. 4 Sub-Area. Salary within the range £715/£760 per annum (N.J.B. E/7). Applicants should have experience in design, construction and operation of E.H.T., H.T. and L.T. overhead and underground distribution systems, including indoor and outdoor substation equipment. Technical qualifications desirable.

The appointment is superannuable and subject to medical examination.

Application forms obtainable from The Manager, No. 4 Sub-Area, Electricity House, Rhostyllen, near Wrexham, should be completed and returned as soon as possible. (V 467)

THE FIRE PROTECTION ASSOCIATION

has the following vacancy: MECHANICAL or ELECTRICAL ENGINEER (age 23-26) with degree, or H.N.C. and GRAD.I.MECH.E. or A.E. and practical experience, to study fire hazards and the whole field of fire protection in relation to all types of industrial processes, and industrial heating and electrical equipment.

This appointment involves a detailed study of causes and methods of prevention of fire, the preparation of reports and advising clients. The successful candidate will have the opportunity to show initiative; after a period of training he will work largely on his own but within a team engaged on similar work on other aspects of fire protection. Salary will be commensurate with qualifications and experience. Non-contributory pension scheme. Applications marked "Private" and giving full particulars and salary required to the Secretary, 15 Queen St, London, E.C.4. (V 462)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

APPLICATIONS are invited for the position of ASSISTANT ENGINEER (Planning) in the North Caledonia Area Headquarters at Elgin. Applicants should be fully experienced in the planning of urban and rural distribution networks and substations in voltages up to 33 kV and preferably have some knowledge of transmission at 132 kV. Salary N.J.B., F/5, £840 x £20—£900 per annum with prospects of promotion to grade F/4 later. The successful applicant will be eligible to contribute to the Board's superannuation scheme, and a suitable house is available.

Applications, stating age, qualifications and experience, to be forwarded to the Area Manager, West Villa, Elgin, Morayshire, by 20 Oct., 1955. (V 456)

YORKSHIRE ELECTRICITY BOARD

No. 4 (Leeds) Sub-Area

Leeds District

FOURTH ASSISTANT DISTRICT ENGINEER

APPLICANTS should be Graduates of the Institution of Electrical Engineers and have experience in the construction, operation and maintenance, and planning of overhead and underground distribution systems in a densely-populated industrial and residential area.

Salary—N.J.B. Class K, Grade 11, £755/£15/£800 per annum.

GENERAL ASSISTANT DISTRICT ENGINEER (COMMERCIAL)

Applicants should have had a sound technical and practical training and be competent to advise consumers in all matters regarding the utilisation of electricity. They should be familiar with the I.E.E. and Supply Regulations and be in possession of the Higher National Certificate in Electrical Engineering or an equivalent qualification.

Salary—N.J.B. Class K, Grade 17, £515/£15/£560 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, near Leeds, not later than 27 Oct., 1955. (V 470)

MANCHESTER EDUCATION COMMITTEE

OPENSHAW TECHNICAL COLLEGE

Principal:
J. R. Fullard, M.ENG., A.M.I.MECH.E.

APPLICATIONS are invited from suitably qualified persons for the following full-time posts:

(*a*) TEACHER OF ELECTRICAL INSTALLATION work to the level of Final City and Guilds Certificate.

(*b*) TEACHER OF ELECTRICAL INSTALLATION to teach the subject to the standard of City and Guilds of London Institute "B" examinations.

Candidates should hold a Higher National Certificate in Electrical Engineering or Final City and Guilds certificate in Electrical Installation and have good industrial experience.

The salary for post (*a*) will be in accordance with the scale for Assistants Grade B of the Burnham Further Education Report 1954 (£525 x £25—£820), and for post (*b*) in accordance with the scale for Assistants, Grade A of the Burnham Further Education Report 1954 (£450 x £18—£725).

The commencing point on the scale may include up to a maximum of twelve increments at £18 for appropriate industrial experience over the age of 21 years, plus increments for war service.

Application forms and conditions of appointment may be obtained (stamped, addressed foolscap envelope) from the Chief Education Officer, Education Offices, P.O. Box 480, Deansgate, Manchester 3, to whom completed application should be returned by 26 Oct., 1955. (V 483)

LONDON ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEER

APPLICATIONS are invited for the above position in the Camberwell District of the Southern Sub-Area.

Applicants should have had a sound technical education and possess practical experience of all branches of engineering work associated with the organisation of a district distribution department, particularly in regard to substations and mains work.

The post is graded under Schedule A of the National Joint Board Agreement as Class E, Grade 10—£624. 15s. per annum, rising to £672 per annum, inclusive of London Allowance.

Application forms obtainable from Personnel Officer, 46/7 New Broad St, London, E.C.2, to be returned completed by 26 Oct., 1955. Please enclose addressed envelope and quote ref.: PER/V/2038/T. (V 455)

NORTHAMPTON POLYTECHNIC

St. John Street, London, E.C.1

SENIOR and Grade III LABORATORY TECHNICIANS required in Electrical Engineering Department. In addition to holidays with pay totalling up to five weeks per year, part-time day release is granted for studies in approved H.N.C. or degree courses. Standard L.C.C. conditions, salary and superannuation are applicable for both grades. Letters of application to Head of Electrical Engineering Department at the above address. (V 499)

CENTRAL ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of ASSISTANT ENGINEER (Instruments) at Stourport "A" and "B" Power Stations. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K.9, £840/£900 per annum.

Applicants should have had considerable experience in the operation and maintenance of all classes of power station instruments (excluding electricity meters), particularly Bailey Automatic Boiler Control, and should hold the Higher National Certificate in Mechanical Engineering, or equivalent qualification.

Apply, quoting vacancy No. 104MD, on form AE6, available from Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 29 Oct., 1955. (V 497)

MECHANICAL AND ELECTRICAL ENGINEERS

In Various Government Departments

THE Civil Service Commissioners invite applications for pensionable posts in a wide variety of mechanical and electrical engineering duties.

Candidates must be under 35 on 1 Jan., 1955, with extension for regular service in H.M. Forces and up to two years for permanent civil service. For the Post Office they must be at least 21, for the Ministry of Supply, and Ministry of Transport and Civil Aviation (Civil Aviation Organisation) at least 23; for other posts at least 25 on that date.

Generally a candidate must possess a University degree in Engineering or be a Corporate Member of one of the professional institutions—Mechanical Engineers, Electrical Engineers, or Civil Engineers or have passes in, or exemption from, Section A or I and B or II of the corresponding Associate Membership examination. Exceptionally, candidates of high professional attainment, but without the specified qualifications, may be admitted. For some posts Associate Fellowship of the Royal Aeronautical Society or an Honours degree in Physics or Engineering will be accepted.

London salary (Men) £705 (at age 25) to £1,095. Starting salary according to age up to £970 at 34. Candidates entering below age 25 will start at salaries varying from £493 at age 21 to £625 at age 24. Prospects of promotion. Salaries of next higher grades are £1,095/£1,415 and £1,470/£1,595. Somewhat lower in the provinces. Women's scales lower but being improved under equal pay scheme.

Further particulars and application forms from Civil Service Commission, Scientific Branch, 30 Old Burlington St, London, W.1, quoting No. S85/55. Completed applications should be returned as soon as possible and in any case before 31 Dec., 1955. (V 474)

AIR MINISTRY

Works Designs Branch

require in London and Provinces (with liability for overseas service) ELECTRICAL ENGINEERING DRAUGHTSMEN experienced in preparation of schemes for illumination and electrical equipment of buildings or in electrical distribution H.V. and M.V. Technical training to O.N.C. standard or equivalent an advantage. Salaries up to £850 per annum, starting pay based on age, qualifications and experience. Paid overtime. Posts non-pensionable with long-term possibilities. Natural-born British subjects only. Write stating age, qualifications, employment details including type of work done to any Employment Exchange, quoting Order No. Borough 2307. (V 38)

CENTRAL ELECTRICITY AUTHORITY

North West Merseyside and N. Wales Division

VACANCY No. E.261/359/T. — STATION SHIFT CONTROL ENGINEER, Chadderton "A" Generating Station, near Manchester. Salary £595/£640 (E.10).

Vacancy No. E.261/366/T. — SECOND ASSISTANT STATION CHEMIST, Clarence Dock Generating Station, Liverpool. Salary £755/£800 (K.11). H.N.C. in Chemistry or A.R.I.C. desired. Experience of chemical analysis of coal, water and oil.

Vacancy No. E.261/370/T. — STATION SHIFT CONTROL ENGINEER, St. Helens Generating Station. Salary £595/£640 (E.10).

Vacancy No. E.261/371/T. — STATION SHIFT CONTROL ENGINEERS (2), Trafford Generating Station, Trafford Park, Manchester. Salary £635/£680 (F.10).

Vacancy No. E.261/372/T.—ASSISTANT SHIFT CHARGE ENGINEER, Westwood Generating Station, Wigan. Salary £715/£760 (G.9).

Vacancy No. E.261/373/T—ASSISTANT SHIFT CHARGE ENGINEER, Chadderton "B" Generating Station. Salary £715/£760 (G.9).

Vacancy No. E.261/375/T.—ASSISTANT SHIFT CHARGE ENGINEER, Huncoat Generating Station. Salary £675/£720 (F.9).

Applications to Divisional Secretary, Central Electricity House, 825 Wilmslow Rd, Manchester 20, before 22 Oct. Quote Vacancy No. (V 489)

SOUTH OF SCOTLAND ELECTRICITY BOARD

THIRD ASSISTANT, PLANNING

APPLICATIONS are invited for the post of Third Assistant (Planning) at Fife Area Headquarters, Dunfermline. Salary and conditions N.J.B. Class G, Grade 10 (£675/£720).

Candidates should preferably have a Higher National Certificate in Electrical Engineering, or possess equivalent qualifications, and have experience in system design. The successful applicant will be required to reside within reasonable distance of Dunfermline.

Applications, on standard form obtainable from the undersigned or from any Area Manager, should be lodged not later than 29 Oct., 1955.

C. H. A. COLLYNS,
Manager.
(V 469)

CENTRAL ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following appointments:

ASSISTANT ENGINEER (INSTRUMENTS)
TILBURY GENERATING STATION

Salary Class J, Grades 12-10, £675 x £15—£720 per annum to £755 x £15—£800 per annum plus London Weighting, depending upon experience and qualifications. Eventually rising to Class K, £715 x £15—£760 per annum to £790 x £20—£850 per annum plus London Weighting.

Applicants should have had a sound technical training and good practical experience in the construction, repair and testing of a wide range of Generating Station instruments and automatic controls.

GENERAL ASSISTANT ENGINEER
BRIMSDOWN GENERATING STATION

Salary Class J, within the range of Grade 17/14, £475/£640 per annum, plus London Weighting.

Duties include assisting in the Electrical Control Room and experience in the technical operation of electrical, boiler house, and turbine house plant testing, etc., in a Generating Station and provide a suitable basis for promotion to higher technical grades.

Manual workers in skilled grades with suitable technical training will be considered. Previous experience in a Generating Station and/or technical training to the standard of the Ordinary National Certificate or its equivalent will be of advantage.

STATION SHIFT CONTROL ENGINEER
LITTLE BARFORD GENERATING STATION

Salary Class G, Grade 10, £675 x £15—£720 per annum.

Applicants should have reached the standard of Ordinary National Certificate in Electrical Engineering or its equivalent, have experience in the operation of a switchboard at a Generating Station and be fully conversant with High Tension Switching operation and protective systems.

Applications stating age, details of qualifications and experience should be sent to the Controller, Central Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, not later than 22 Oct., 1955.

W. N. C. CLINCH,
Controller.
(V 464)

EASTERN ELECTRICITY BOARD
Northmet Sub-Area

173/55.R

FOURTH ASSISTANT ENGINEER—
EDMONTON DISTRICT

CANDIDATES should have had a sound technical training and experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations.

Salary—N.J.B. Class F, Grade 11 (£595/£640) plus London Allowance.

The successful candidate will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Apply, by letter, within 14 days, to the District Manager, Eastern Electricity Board, 305 Fore St, Edmonton, London, N.9.
(V 486)

STAFFORDSHIRE EDUCATION COMMITTEE
County Technical College, Stafford

Principal:
A. TORKINGTON, B.SC.(HONS.), M.I.MECH.E.

APPLICATIONS are invited for the post of full-time ASSISTANT to teach Electrical Installations for the Course C certificate of the City and Guilds of London Institute. Practical experience in installation work is essential. Salary according to the Burnham Scales for Technical Teachers, Grade B, viz.: £525 x £25—£820.

Form of application (returnable by 21 Oct.) and further particulars may be obtained from the undersigned on receipt of a stamped addressed foolscap envelope.

J. H. P. OXSPRING,
Direction of Education.

Dept. F.E.,
County Education Office,
Stafford. (V 443)

THE NORTH WESTERN ELECTRICITY BOARD

THIRD ASSISTANT ENGINEER (TESTING), TECHNICAL ENGINEER'S SECTION, CHIEF ENGINEER'S DEPARTMENT, AREA BOARD HEADQUARTERS

DUTIES will include testing all types of equipment used on a distribution system. Experience in metering and protective gear testing would be an advantage. Applicants should hold the H.N.C. in Electrical Engineering or its equivalent.

Salary Scale: £750/£975 per annum, Grade AX/EX.4, N.J.B. Conditions. Commencing salary within range £750/£875 per annum.

SENIOR DRAUGHTSMEN, CHIEF ENGINEER'S DEPARTMENT, AREA BOARD HEADQUARTERS

Applicants for Senior Draughtsmen (Electrical) should have had a good technical training, with drawing office experience in the layout and detailing of indoor and outdoor substations, up to and including 33,000 V, together with diagrams of connections of the associated switchgear transformers and protective systems and be capable of supervising Engineering Draughtsmen.

Applicants for Senior Draughtsmen (Building and Civil Engineering) should have a sound knowledge of building construction and be capable of preparing working drawings and details for industrial buildings. Some knowledge of the design of reinforced concrete and/or steel work structure is desirable.

Salary within range: £640 x £20—£740 per annum, Schedule D, Grade 5, N.J.B. Conditions.

GENERAL ASSISTANT ENGINEER (TESTING), TECHNICAL ENGINEER'S SECTION, CHIEF ENGINEER'S DEPARTMENT, AREA BOARD HEADQUARTERS

Duties will include assistance in the testing of all equipment used on a distribution system. Applicants should preferably hold the H.N.C. in Electrical Engineering or its equivalent.

Salary Scale: £475/£630 per annum, Class AX/EX.7. N.J.B. Conditions.

ENGINEERING DRAUGHTSMEN, CHIEF ENGINEER'S DEPARTMENT, AREA BOARD HEADQUARTERS

Applicants for Engineering Draughtsmen (Electrical) should have had a good technical training with drawing office experience in the layout of switchgear and transformers together with the associated diagrams of connections.

Applicants for Engineering Draughtsmen (Building and Civil) should have a sound knowledge of building construction and be capable of preparing working drawings and details of industrial buildings.

Salary within range: £510 x £20—£630 per annum. Schedule D, Grade 6, N.J.B. Conditions.

Applications for the above posts to Establishment Officer, The North Western Electricity Board, Cheetwood Rd, Manchester, by 22 Oct., 1955.

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER (SALES SUPERINTENDENT)
LEIGH DISTRICT

Applicants should be experienced in the supervision of Service Centres, organisation of exhibitions, demonstrations and displays. The successful candidate will

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be responsible for Domestic and Commercial development and the supervision of the staff engaged on that work. Experience in a rural area would be an advantage. Ability to develop business is essential and preference will be given to applicants with technical qualifications.

Salary Scale: £755 x £15—£800 per annum, Grade F.7, N.J.B. Conditions.

Applications to Sub-Area Manager, No. 2 Sub-Area, The North Western Electricity Board, 2 St. George's Rd, Bolton, by 22 Oct., 1955.

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER, BURNLEY DISTRICT

The successful applicant will be required to assist in the control and supervision of industrial and domestic contract wiring, the preparation of specifications, and the installation, repair and maintenance of appliances on consumers' premises. Preference will be given to applicants with technical qualifications.

Salary Scale: £675 x £15—£720 per annum, Grade F.9, N.J.B. Conditions.

Applications to Sub-Area Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee St, Blackburn, by 22 Oct., 1955.
(V 471)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

Central Gloucestershire Sub-Area

THIRD ASSISTANT DISTRICT ENGINEER
(SEVERN VALE DISTRICT)

Applicants should have had a sound technical training and experience in the construction, maintenance and operation of overhead and underground systems and substations. Technical qualifications desirable. Salary £635/£680 per annum (N.J.B. Grade E.9).

Apply in writing within fourteen days, stating age, qualifications, experience, present position and salary to Sub-Area Manager, Midlands Electricity Board, 126 London Rd, Gloucester.

THIRD ASSISTANT DISTRICT ENGINEER
(STROUD DISTRICT)

Duties involve the construction, maintenance and operation of E.H.V. and L.V. mains and substations, and planning of system reinforcements and mains extensions. Technical qualifications desirable. Salary £635/£680 per annum (N.J.B. Grade E.9).

Apply in writing within fourteen days, stating age, experience, present position, qualifications and salary, to Mr R. C. Wright, District Manager, Midlands Electricity Board, Dudbridge, Stroud.

South Staffs and North Worcs Sub-Area

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER (STOURBRIDGE DISTRICT)

Applicants should have had a sound technical training with practical experience in the sale and installation of domestic and commercial electrical equipment and the wiring associated therewith. Experience of estimating for installation work and the possession of appropriate technical qualifications will be considered an advantage. The duties will include the supervision of contracting work, advising consumers in respect of new supplies, extensions, alterations and estimating for same. Salary £635/£680 per annum (N.J.B. Grade F.10).

Apply in writing within fourteen days, stating age, qualifications, experience, present position and salary to Sub-Area Manager (Ref.: CW), Midlands Electricity Board, Toll End Rd, Tipton, Staffs.

Shropshire and Herefordshire Sub-Area

SENIOR SERVICE CENTRE ASSISTANT
(MALE) (WALLINGTON DISTRICT)

Duties involve the supervision of Service Centre and the promotion of sales of electricity and electrical appliances. Experience essential. Salary £585/£605 per annum (N.J.C. Grade 3).

Apply in writing within fourteen days, stating age, experience, present position, to District Manager, Midlands Electricity Board, Broadway, Haygate Rd, Wallington, Salop.

A. STEPHENS,
Secretary.
(V 487)

CENTRAL ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

ASSISTANT ENGINEER
(COAL AND ASH PLANT)
CASTLE DONINGTON POWER STATION

Vacancy No. 166/55/ET

Applications are invited from suitably qualified Engineers, with a wide experience of operation and maintenance in a large Power Station with P.F. Boilers.

The successful applicant will be responsible for the programming of coal traffic and for the operation of the Coal and Ash Plants.

The salary will be in accordance with the National Joint Board Agreement, Class L, Grade 8 (£975 x £25—£1,050 per annum).

Closing date for receipt of applications, 21 Oct., 1955.

ASSISTANT SHIFT CHARGE ENGINEERS
CASTLE DONINGTON POWER STATION

Vacancy No. 167/55/ET

Applications required from suitably qualified Engineers who have had sound experience in the operation of modern high-pressure Generating plant.

The salary will be in accordance with Class L, Grade 9 (£900 x £25—£975 per annum).

Closing date for receipt of applications, 21 Oct., 1955.

MAINTENANCE ENGINEER (ELECTRICAL)
LONGFORD POWER STATION, COVENTRY

Vacancy No. 171/55/ET

Applicants should have received a thorough technical and practical training followed by considerable experience in testing protective gear, maintenance of alternators, transformers, switchgear and associated equipment and be capable of taking control of the electrical maintenance staff.

Preference will be given to candidates who are associated members of a recognised Institute or possess similar qualifications.

Salary will be in accordance with Class G, Grade 6 (£840/£900 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 28 Oct., 1955.

THIRD ASSISTANT ENGINEER
GENERATION (CONSTRUCTION) DEPARTMENT

Vacancy No. 173/55/ET

Preference will be given to applicants who have a degree in Civil Engineering, are Corporate Members of the Institution of Civil Engineers or possess equivalent qualifications.

They should have had experience in the design and construction of heavy foundations, river works, structures in reinforced concrete and steel, and other civil engineering works associated with the design and construction of Power Stations.

Experience in the preparation of specifications, bills of quantities and estimates will be an advantage.

Salary will be within Class AX/DX, Grade 4 (£750/£950 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 28 Oct., 1955.

SHIFT CHARGE ENGINEER
LEICESTER POWER STATION

Vacancy No. 169/55/ET

Candidates should be in possession of the H.N.C. in Electrical Engineering or equivalent and have had previous experience in the operation of a large pulverised fuel-fired Station.

Salary will be in accordance with Class H, Grade 7 (£840 x £20—£900 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 21 Oct., 1955.

ASSISTANT SHIFT CHARGE ENGINEER
FREEMEN'S MEADOW POWER STATION, LEICESTER

Vacancy No. 172/55/ET

Applicants should have experience in the operation of a large pulverised fuel-fired Station. The principal duties will be in the Boiler House. Technical qualifications up to H.N.C. are desirable.

Salary will be in accordance with Class H, Grade 9 (£755 x £15—£800 per annum) of the National Joint Board Agreement.

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Closing date for receipt of applications, 28 Oct., 1955.

These appointments will be pensionable within the terms and provisions of the Central Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.

7 Oct., 1955. (V 480)

SOUTH EASTERN ELECTRICITY BOARD

SECOND ASSISTANT COMMERCIAL ENGINEER (INSTALLATION)

Surrey Sub-Area Headquarters, Dorking

SALARY £900/£975 per annum in accordance with Grade 8, Class K, of the N.J.B. Agreement. Superannuable. Applicants should have had extensive experience in installation work and electrical contracting of all types. A thorough knowledge of the Electricity Supply Regulations and the Regulations for the Electrical Equipment of Buildings is essential.

Applications, naming 2 referees, on forms from C. W. Hughes, B.SC., M.I.E.E., Surrey Manager, SEEBoard, Rough Rew, Horsham Rd, Dorking, by 26 Oct., 1955.

GENERAL ASSISTANT ENGINEER

Eastbourne District

Salary £555/£600 per annum under N.J.B. Class E, Grade 11. Superannuable. Applicants should preferably hold the Higher National Certificate in Electrical Engineering or its equivalent, and have had practical experience in general distribution work on systems up to 11 kV.

Applications, naming 2 referees, on forms from J. E. Winborne, Eastbourne Manager, SEEBoard, Electric House, Grove Rd, Eastbourne, by 26 Oct., 1955.

SENIOR SALES REPRESENTATIVE

Croydon District

Salary £525 x £20—£585 per annum plus London Weighting, under N.J.C. Grade 2. The successful applicant should be able to advise on supply matters, tariffs, apparatus and sales to consumers with domestic or small commercial or industrial installations. A sound knowledge of wiring an advantage.

Applications, naming 2 referees, on forms from H. Lowe, M.I.E.E., District Manager, SEEBoard, Electric House, Wellesley Rd, Croydon, by 26 Oct., 1955.

CARTOGRAPHIC DRAUGHTSMAN (MALE)

West Kent District

Salary within the range £190/£495 per annum plus London Weighting, according to age and experience. New entrants for the higher scale must have certain educational qualifications. Superannuable. Applicants should have a sound general education and experience of general drawing office routine.

Applications, naming 2 referees, on forms from P. S. Watson, M.I.E.E., West Kent District Manager, SEEBoard, 270 High St, Orpington, by 26 Oct., 1955.

ASSISTANT DISTRICT COMMERCIAL ENGINEER

Central Sussex District

Salary £675/£720 per annum under N.J.B. Class E, Grade 8. Applicants must have had extensive experience in contracting and consumer service and be able to prepare specifications and estimates for domestic, commercial and industrial installations. A knowledge of farming applications would be an advantage.

Applications, naming 2 referees, to Arthur Barnes, M.I.E.E., Central Sussex District Manager, SEEBoard, Electra House, Church Rd, Haywards Heath, by 26 Oct., 1955.

ASSISTANT ENGINEER

Dover District

Salary £635 x £15—£680 under N.J.B. Class E, Grade 9. Superannuable. Applicants should hold the Higher National Certificate in Electrical Engineering or its equivalent, and have practical experience in general distribution work on systems up to 11 kV.

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Applications, naming 2 referees, to R. G. Widgery, A.M.I.E.E., District Manager, SEEBoard, Ladywell, Dover, Kent, by 26 Oct., 1955.

ASSISTANT DISTRICT ENGINEER

Swale District at Sittingbourne

Salary £555 x £15—£600 under N.J.B. Class E, Grade 11. Superannuable. Applicants should have had experience in the construction, operation and maintenance of E.H.T. and L.T. O/H and U/G systems with indoor and outdoor type substations, and should hold a Higher National Certificate or its equivalent in electrical engineering. The person appointed will be required to reside in the district and accommodation is available.

Applications, naming 2 referees, to F. E. Fairbank, A.I.E.E., District Manager, SEEBoard, 88a High St, Sittingbourne, Kent, by 26 Oct., 1955.

A. L. BURNELL,
Secretary.
(V 484)

SNOWY MOUNTAINS HYDRO-ELECTRIC AUTHORITY

Australia

APPLICATIONS are invited for the position of:

EXECUTIVE ENGINEER GRADE I—II
(Electrical)

Salary ranges will be within the limits of £A1,958 to £2,498 and commencing salary which will commence from date of entry on duty will be determined in accordance with qualifications and experience.

Applicants should have the ability to undertake the organisation and administration of a section of Electric Power Branch and should have extensive experience in the design, layout and installation of plant for hydro-electric power stations and switching stations.

Qualifications required are a degree in Electrical Engineering of a recognised University, corporate membership of the Institution of Engineers (Australia), or of the Institution of Electrical Engineers (London), or examination qualifications giving exemption from corporate membership of these Institutions. Ability to initiate and interpret procedures and to improve existing engineering methods and to plan and integrate engineering programmes of work and to direct, co-ordinate and evaluate the work of subordinate staff, is essential.

Subject to certain conditions, the Authority will pay first class steamship fares to Australia of successful applicants, and if married, those of their wives and children under 16 years of age.

The successful applicant will be required to take up duty initially in Sydney but at a later date will be required to move to the Snowy Mountains Area in south-eastern New South Wales.

Applications, accompanied by a recent photograph and copies only of testimonials, and giving full details of qualifications and experience, should be addressed to the Snowy Mountains Hydro-Electric Authority, c/o Australia House, The Strand, London, W.C.2. Applications close on Monday, 31 Oct., 1955. (V 465)

ELECTRICAL MAINTENANCE SUPERINTENDENT

required by International Oil Group operating an Oil Refinery in Persia to take complete charge of electrical maintenance covering 33 kV, 11 kV, 3·3 kV and L.V. power distribution networks supplied from a Refinery Power Station of 80 MW capacity, together with the equipment installed in the Refinery Process Plants, Industrial Buildings, Housing Areas, etc.

Candidates should possess as a minimum qualification Corporate Membership of the Institute of Electrical Engineers and they must be fully conversant with the best modern maintenance practice.

The appointment is for two years, married accommodation is available and family passages will be paid. Salary £242 per month free of Iranian Income Tax.

Write Box E.T. 224, c/o 191 Gresham House, E.C.2. (V 490)

CENTRAL ELECTRICITY AUTHORITY

South Eastern Division

ASSISTANT ENGINEERS (WORKS OFFICE CO-ORDINATION)—CROYDON "A" AND "B" AND KINGSTON "A" AND "B" POWER STATIONS

THE purpose of these positions is to co-ordinate the work of operation, maintenance and other technical services, and includes responsibility for staff engaged upon the planning of plant maintenance and the development of new methods of working. The posts offer exceptional opportunities to those having experience of maintenance in the engineering industry and of power plant operation. These are new appointments calling for organising ability and the development of fresh ideas. Education up to Higher National Certificate is desirable. N.J.B. Conditions of Service and salary—Croydon "A" and "B," Class K, Grade 7, £975/£1,050 per annum; Kingston "A" and "B," Class G, Grade 7, £790/£850 and Grade 8, £755/£800 per annum plus London allowance.

ASSISTANT ENGINEER (EFFICIENCY)—CROYDON "B"

Applicants should preferably have had technical training up to Higher National Certificate standard and must have had experience in the operation of a modern power station, together with a knowledge of methods of plant efficiency control. Class J, Grade 11, £715/£760 per annum plus London allowance.

GENERAL ASSISTANT ENGINEER (CHEMIST) LITTLEBROOK POWER STATION

Applicants should possess Ordinary National Certificate (Chemistry) or equivalent qualifications and possess a sound knowledge of elementary chemistry. Class L, Grade 19, £500/£546 per annum including London allowance.

GENERAL ASSISTANT ENGINEER LITTLEBROOK POWER STATION

Required for general duties including those in the Control Room and on the Efficiency Section. Ordinary National Certificate standard preferable. Class L, Grade 19, £475/£520 per annum when in Control Room and appropriate grading when engaged in Efficiency Section, i.e. Grade 18, £515/£560 per annum. All salaries subject to addition of London Allowance.

Applications giving details of education, present position, experience, etc., should be sent according to the location of vacancy to the following:

Station Superintendent, Croydon "B" Power Station, Beddington Farm Rd, Croydon, Surrey.

Station Superintendent, Kingston "B" Power Station, Downhall Rd, Kingston-on-Thames, Surrey.

Station Superintendent, Littlebrook Power Station, Nr. Dartford, Kent.

Closing date for receipt of applications, 22 Oct. (V 501)

LIVERPOOL EDUCATION COMMITTEE

College of Technology, Byrom Street, Liverpool, 3

Principal: E. G. Edwards, B.SC., PH.D., F.R.I.C.

APPLICATIONS are invited for the appointment of SENIOR LECTURER in the Department of Electrical Engineering, commencing not later than 1 Jan., 1956.

Salary, £1,065 x £25 to £1,215 per annum (Burnham Technical Scale, 1954, for Senior Lecturers).

Applicant should have a good Honours Degree in Electrical Engineering or be a Corporate Member of the Institution of Electrical Engineers.

Experience should include teaching at an advanced level and industrial experience in the design and manufacture of electrical machines or electrical power. Some administrative experience and ability to initiate research projects would be an advantage.

Application forms and conditions of appointment obtainable from H. S. Magnay, M.A., Director of Education, 14 Sir Thomas St, Liverpool 1, should be returned to him by 4 Nov., 1955.

THOMAS ALKER,
Town Clerk and Clerk to the Local Education Authority.
(V 527)

CITY OF BELFAST

APPLICATIONS are invited for the following positions in the Electricity Department:

(*a*) CIVIL ENGINEER

Applicants must have a University Degree in Civil Engineering or be Corporate Members of the Institution of Civil Engineers or hold equivalent qualifications. They must have had a sound engineering training and good practical experience. They must not be more than 45 years of age on the date of taking up the appointment.

Salary in accordance with Grade 3, Class H, of the Northern Ireland Joint Board Schedule of Salaries for Technical Engineers on the Staff of Authorised Undertakers, viz. £1,110 rising by annual increments of £30 to £1,200 per annum.

(*b*) JUNIOR ASSISTANT SHIFT ENGINEER

Applicants must have a University Degree or the Higher National Certificate in Electrical or Mechanical Engineering, or be Corporate Members of the Institution of Electrical Engineers. They must have had a sound engineering training. They must not be more than 35 years of age on the the date of taking up the appointment.

Weekly wages equivalent to Grade 11, Class H, of the N.I.J.B. Schedule, viz. £675 x £15—£720 per annum. Upon completion of 12 months' satisfactory service the position will be established on the salary list.

The following conditions apply to both the above posts:

Superannuation contributions will be payable at the rate of approximately 6% of remuneration. The Corporation is empowered to enter into reciprocal pension arrangements with certain Authorities.

Canvassing in any form will disqualify.

Application forms are obtainable from the Electricity Department, East Bridge St, Belfast. Completed applications must reach the undersigned not later than 4 p.m. on Thursday, 3 Nov., 1955.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast,
P.O. Box 234.
7 Oct., 1955. (V 498)

SOUTHERN ELECTRICITY BOARD

ASSISTANT ENGINEER (PLANNING)

YEOVIL District of No. 4 (Bournemouth) Sub-Area. Salary N.J.B. Class F, Grade 9 (£675 x £15—£720 per annum). N.J.B. Conditions of Service.

The successful candidate will be required to assist the Planning Engineer in the preparation of schemes and estimates for extensions and/or reinforcements to overhead and underground H.V. and L.V. networks. Applicants should have had experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground systems, substation plant and distribution equipment. The possession of suitable technical qualifications will be an advantage, and the appointment will involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Rd, Bournemouth, and returned to him in envelopes suitably endorsed not later than 28 Oct., 1955.

ASSISTANT ENGINEER (GENERAL)

Southampton District of No. 4 (Bournemouth) Sub-Area. Salary N.J.B. Class F, Grade 10 (£635 x £15—£680 per annum). N.J.B. Conditions of Service.

Applicants should have had experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant and distribution equipment. The possession of suitable technical qualifications will be an advantage, and the appointment will involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Rd, Bournemouth, and returned to him in envelopes suitably endorsed not later than 28 Oct., 1955.

GENERAL ASSISTANT ENGINEERS

(*a*) Aldershot District (Petworth), Portsmouth Sub-Area, Class F.
(*b*) Basingstoke District, Portsmouth Sub-Area, Class E.

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(*c*) Isle of Wight District, Portsmouth Sub-Area, Class E.

The commencing salaries will be £515 per annum (£515 x £15—£560) in accordance with the appropriate grade for the District Classification in Schedule A of the N.J.B. Agreement. N.J.B. Conditions of Service.

Applicants will be required to assist in distribution duties including minor construction work and general maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant, etc., and possess suitable technical qualifications. The appointments will involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes suitably endorsed not later than 28 Oct., 1955.

The successful candidates for the above appointments will be required to contribute to the C.E.A. and Area Boards' Superannuation Scheme, if eligible. (V 500)

LONDON ELECTRICITY BOARD

SENIOR DEVELOPMENT ASSISTANT

APPLICATIONS are invited for the above position in the Roding District of the Board's North Eastern Sub-Area.

Applicants are required to have a sound knowledge of all aspects of service to consumers, and be capable of planning and estimating for domestic, commercial and small industrial installations. They should possess a good knowledge of electrical apparatus and the basic principles of tariffs and their application.

The post is graded within the National Joint Council agreement (Administrative and Clerical Grades) as Grade 2, i.e. £525/£585 per annum plus the appropriate London Area Allowance.

Application forms obtainable from Personnel Officer, 46/7 New Broad St, London, E.C.2, to be returned completed by 2 Nov., 1955. Please enclose addressed envelope and quote ref.: PER/V/2022/T. (V 526)

CENTRAL ELECTRICITY AUTHORITY

Midlands Division

GENERAL ASSISTANT ENGINEER is required in the Metering Section of the Technical Department. N.J.B. service conditions, superannuable appointment, salary within Schedule C, Grade 7, commencing in range £475/£550, and ultimately rising to £610 per annum.

Applicants should possess ordinary national certificate in electrical engineering and have metering experience, particularly in the calibration of electrical indicating instruments.

Apply, quoting Vacancy No. 107MD, on form AE6, available from Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 29 Oct., 1955. (V 494)

A CHARGEHAND ELECTRICAL FITTER with or without winding experience. Good opportunity for right man with repair shop experience of all types of electric motors. Good rate, 5-day week, overtime, bonus, etc.—Box No. 4879, Electrical Times. (V 448)

A SALES ENGINEER, aged 25 to 35 years, preferably single with electrical background and selling experience, required by East African electric cable firm. Applicants must be prepared for extensive travelling in that territory (Kenya, Uganda, Tanganyika). Two or three year contract; air passages paid.—Box No. 4903, Electrical Times. (V 525)

AREA SALES MANAGER required with full experience of selling domestic appliances to the electrical retail trade in London and the Home Counties. Must be well educated and of good appearance, energetic, medically fit and capable of building up and controlling a new section of the sales staff for the electrical field. Satisfactory references required. Superannuation scheme. Good prospects for a first class man. Apply in own handwriting stating full details of age, experience and salary required to the Sales Director, Main Refrigeration Ltd., 48 Grosvenor Gardens, London, S.W.1. (V 478)

CENTRAL ELECTRICITY AUTHORITY
Bankside House, London, S.E.1

Due to the expansion of the Drawing Office opportunities occur for CIVIL and ELECTRICAL DRAUGHTSMEN to gain experience in the layout and design of 132 kV and 275 kV Grid substations.

There are vacancies for Senior Draughtsmen (Grade 4 and 5) and Draughtsmen (Grade 6) N.J.B. salaries inclusive of London Allowance:

Grade 4, £788 x £21—£893 per annum.
Grade 5, £672 x £21—£777 per annum.
Grade 6, £536 x £21—£662 per annum.

Senior Draughtsmen should be competent draughtsmen with supervising ability, and experience on design. Draughtsmen on Grade 6 will be given opportunities to gain experience on design work.

Canteen. One Saturday morning in four on duty. Superannuation Scheme. Opportunities for promotion. Application forms from D. Moffat, Director of Establishments, Winsley St, W.1. Quote Ref.: AE/674. (V 454p)

A MAN of character and ability combined with experience and a desire to undertake responsibility is required for an important telephone cable sales and estimating department. Salary will be commensurate with experience and the appointment has good prospects, is permanent and pensionable. Typewritten applications should state salary expected and in chronological order details of experience with salaries received. All applications will be treated in the strictest confidence.—Box No. 4867, Electrical Times. (V 390)

APPLICATIONS are invited for the position of ASSISTANT TECHNICAL SALES REPRESENTATIVE on Radiant Boiling Plates and Industrial Heating Elements for London and Southern Counties.

Write stating age, qualifications and salary required to Metropolitan-Vickers Electrical Co., Ltd., 1/3 St. Paul's Churchyard, London, E.C.4, quoting reference LHS. (V 509)

ASSISTANT MANAGER required for Plastics Division Cable Factory—London Area. 3 roomed flat with bathroom provided close to works.—Box No. 4895, Electrical Times. (V 518)

ASSISTANT ELECTRICAL ENGINEER for Plant Development and Maintenance work in large factory in S.E. London. Must have experience in H.T. and L.T. supplies and distribution. Permanent position and prospects to suitable person. Staff Superannuation. Apply stating age, experience, etc., to—Box No. 4881, Electrical Times. (V 449)

BRITISH Engine Boiler and Electrical Insurance Co., Ltd., 24 Fennel St, Manchester 4. The Company has vacancies for ELECTRICAL PLANT INSPECTORS in various districts in England and Scotland (Dundee). Permanent positions carrying progressive salary scale £600/£850 and non-contributory pension. Candidates age 26 to 30 years with apprenticeship in the manufacture or repair of electrical machinery and preferably with subsequent experience of industrial use of electrical machinery, and who have gained the Higher National Certificate in Electrical Engineering or are Graduates of the Institution of Electrical Engineers, are invited to apply in own handwriting stating age, qualifications and experience. (V 507)

SWITCHGEAR DRAUGHTSMEN
required for switchgear design and development up to 11 kV. Workshop experience and O.N.C. minimum required. Apply in writing giving details of age, experience and salary required to: Whipp and Bourne Ltd., Switchgear Works, Castleton, Rochdale. (V 236p)

BRITISH PETROLEUM CO., LTD., have a vacancy at its London Office for an ELECTRICAL ENGINEER. Applicants under 35 years must have had a thorough Works training and responsibility for the layout, development, specification and design of power networks, covering both overhead and underground systems from 33 kV to low voltage. Candidates should have an Engineering Degree, and be Corporate Members of the Institution of Electrical Engineers. Experience in the layout of large industrial installations, including small power and lighting, is essential and with flameproof equipment an advantage. Salary according to age, qualifications and experience. Non-contributory Pension Scheme. Luncheon Club. Write, giving full particulars, quoting H.3518, to Box 8150, c/o 191 Gresham House, E.C.2. (V 477)

BURCO LTD., invite applications from young men of good character engaged in the Electrical Industry for new posts of ASSISTANT SALES/SERVICE REPRESENTATIVES. Some practical, but mainly selling experience necessary. Salary £600 per annum. Pensionable. New light van and all expenses paid. Must be resident centrally within any of the following Electricity Board Areas: Yorkshire, Eastern, North Western, South Western, Southern, South Eastern. Burco Ltd., Rosegrove, Burnley, Lancashire. (V 505)

CONNOLLYS (BLACKLEY) LIMITED invite applications for the position of REPRESENTATIVE for their Winding Wire Division in London to cover an area generally south of the Thames. Car provided, superannuation scheme. Applications should state full particulars and salary required. They will be treated in strict confidence and should be addressed to the Sales Manager, Connollys (Blackley) Limited, Kirkby Industrial Estate, Liverpool, and marked confidential. (V 514)

DESIGNERS required with experience of D.C. or A.C. Dynamo-electric machines. Must be capable of using initiative. Applications should mention age and details of technical education and experience. Positions are progressive. All applicants will be interviewed at their convenience and expenses paid. Replies should be addressed to the General Manager, Lancashire Dynamo and Crypto Ltd., Trafford Park, Manchester 17. (V 439)

DESIGNERS with initiative required for D.C. or A.C. rotating machines by well-known firm in N.W. England. Should be capable of taking responsibility and working with little supervision. The posts offer good prospects. Interviews will be arranged to suit applicants' convenience, expenses refunded. Write stating full details, age, experience, etc.—Box No. 4875, Electrical Times. (V 440)

DEVELOPMENT ENGINEER to take full charge of Design and Development Department. Must have electrical and mechanical qualifications. Age preferably between 35 and 40. Good progressive and pensionable position for any man with experience in small switch design. Write, giving experience, to Arrow Electric Switches Ltd., Hanger Lane, Ealing, London, W.5. (V 515)

DRAUGHTSMAN (Electrical) required to assist Contract Engineers. Surrey Area, 20 miles London. Salary up to £750 per annum according to technical qualifications, ability and experience on outdoor switchgear layouts for 132 kV and above. Vacancies also for Juniors. Apply—Box No. 4845, Electrical Times. (V 326)

DRAUGHTSMAN required for general work in electrical laboratories in Shepherds Bush area. Previous experience in the electrical industry is not essential. Pension Fund. Five-day week. Apply in writing to —Box No. 4885, Electrical Times. (V 457)

ENGLISH ELECTRIC

have vacancies for TRANSFORMER SALES and CONTRACTS ENGINEERS at their Liverpool Works.

Young engineers having H.N.C. or equivalent qualifications and previous experience or a desire for experience in this field are invited to apply for these appointments which are pensionable after qualifying period.

Apply stating age, experience and qualifications to Dept. C.P.S., 336/7 Strand, W.C.2, quoting Ref. 898C. (V 453p)

ELECTRICIANS required for work in Cyprus. Details of age, experience, etc. to—Box No. 4877, Electrical Times. (V 441)

ELECTRICAL MOTOR DESIGNER required by centrifugal pump manufacturers. Must be experienced in the design and development of medium-sized A.C. and D.C. machines, submersible type motors, etc. Excellent opportunity for qualified, enthusiastic and practical man to improve established and internationally known machines, and to introduce new ideas. The post is one of responsibility and salary will be in accordance. Please send full details, including age, qualifications and experience, to The General Manager, James Beresford and Son Ltd., Stork Works, Kitts Green, Birmingham 33. Applicants may be assured that their replies will be treated as fully confidential. (V 513)

ELECTRICAL BUYER required for London Office of Merchant Company operating in Africa and Middle East. Applicants must have practical experience in the handling of Domestic appliances, Radio and contractors' materials. This experience must be supported by adequate technical knowledge and proved commercial ability. Commencing salary according to experience and qualifications. The Company's expanding electrical business will offer opportunity for advancement to the man who can recognise and seize it. Pension scheme and canteen. 5-day week. Write in full to Box No. 9226, c/o Charles Barker and Sons Ltd., 31 Budge Row, London, E.C.4. (V 524)

ELECTRICAL Control Circuits. ELECTRICAL ENGINEERS and DRAUGHTSMEN are required for the preparation of schemes and circuit diagram for the control of power switchgear. Preference will be given to men with a Higher National Certificate in Electrical Engineering and who have previous experience on this class of work, but others with the minimum qualifications of Ordinary National Certificate may be considered for training. Apply with full particulars to the Chief Engineer, A. Reyrolle and Co., Ltd., Hebburn, Co. Durham. (V 512)

ELECTRICAL SUBCONTRACTORS required by Communications Company of national repute for Time System installations in a number of areas. Generous commission also given on introduction to new prospects, as well as payment for profitable installation work. Apply Moderntyme Division, Modern Automatic Telephones Ltd., 101 Tottenham Court Rd, London, W.1. (V 510)

ELECTRICIAN required by London Electricity Board in Contracting Section, Western Sub-Area (situated in Central London), N.J.I.C. rates and conditions—4s. 5d. per hour (44-hour, 5-day week). Application forms from Personnel Officer, 46/7 New Broad St, London, E.C.2. Please enclose addressed envelope and quote ref.: M/4422/T. (V 506)

ENGINEERING DESIGNER required by large manufacturer; must have keen interest and good experience in the design of quantity produced domestic appliances, also a flair for the application of pressed sheet metal work to simple, easily produced constructions. A good knowledge of production engineering methods and vitreous enamelling work would be an advantage. This is a senior position with considerable responsibility which should provide a sense of purpose and achievement and an opportunity for an ambitious man to make substantial progress in this field. The job carries a good four-figure salary; pleasant working conditions. Pension Scheme, etc. Own staff already notified. Please give full details of experience to—Box No. 4853, Electrical Times. (V 369)

ENGINEER for Technical Engineering Department. Duties include the preparation of schemes for new thermal and nuclear energy power plants, both industrial and central, and also the technical analysis of existing plants. Candidates will be expected to provide evidence that their technical and practical background is such as will enable them to assess correctly a client's plant requirements and also to determine the suitability of plant offered by a manufacturer. The work involves a considerable knowledge of thermodynamics, fluid flow mechanics, physics and the application of these to power plant problems, for these reasons the possession of a good academic qualification in engineering is desirable. The successful candidate will be centred in London, but will be expected to undertake short visits to plant sites as required. Applications, giving details of training, qualifications and experience to date, for the above position, should be sent to the Personnel Officer, Ewbank and Partners Ltd., Engineering Consultants, 10/11 Grosvenor Place, London, S.W.1. (V 348)

ENGINEER required for duties in Contracts Dept., engaged on the preparation of switchgear tenders and their subsequent engineering. Apply The Power Equipment Co., Ltd., Kingsbury Works, Kingsbury Rd, N.W.9. (V 386)

FIRM manufacturing a specialised product on the N.E. Coast requires the following personnel for its Research and Development Department.

(1) ELECTRICAL ENGINEER or PHYSICIST with Degree or Higher National Certificate and having some years' experience in electrical measurements, both at power and radio frequencies, particularly with reference to low loss insulation. The successful applicant will be expected to take charge of a small team and work on a variety of problems with a minimum of supervision.

(2) METALLURGIST or CHEMIST with knowledge of metallurgy. A Degree or equivalent professional qualification is desirable and applicants should have experience in corrosion, inorganic analysis and a knowledge of cold working and annealing of metals.

A contributory Superannuation Scheme is in operation and a five-day week is worked. Applicants should write giving full details of their qualifications and experience, and all replies will be treated in the strictest confidence.—Box No. 4871, Electrical Times. (V 432)

FOSTER TRANSFORMERS LTD., South Wimbledon, London, S.W.19, have vacancies for DESIGNERS and DRAUGHTSMEN with experience of small transformers. Apply giving full details of experience and salary expected to the Personnel Officer. (V 504)

GRADUATES in Maths, Physics or Engineering are required for research and development work in telecommunications. They will be offered opportunities for advancement to senior executive appointments. Pension scheme. Applications, which will be treated in the strictest confidence, to ATCM, Southern United Telephone Cables Ltd., Dagenham Dock, Essex. (V 430)

GEORGE WIMPEY AND CO., LTD., invite applications from ASSISTANT ELECTRICAL ENGINEERS and DRAUGHTSMEN for the design and detailing of lighting and power installations. Applicants must have had drawing office experience and be capable of working on their own initiative. Permanent, progressive appointments. Apply, stating age and brief details of experience, to Department 5 (Electrical), 27 Hammersmith Grove, London, W.6. (V 452)

JUNIOR and SENIOR ELECTRICAL DRAUGHTSMEN, with or studying for, the National Certificate, required for power and lighting distribution of factories, chemical, and refinery plants. Good prospects and salary, non-contributory pension scheme and luncheon vouchers, London area. Apply, quoting B 5072, to Personnel Manager, Costain John Brown Ltd., 73 South Audley St, London, W.1. (V 508)

JUNIOR ENGINEER for work on the development of X-ray equipment and allied electronics. Experience on transformers desirable. Graduate or H.N.C. Electrical. Write giving full details to the Personnel Officer, Philips Balham Works Ltd., 45 Nightingale Lane, Balham, S.W.12. (V 399)

LARGE British Electrical Manufacturing Concern in India invites applications for a supervisory position. Candidates should be capable of supervising all stages of manufacture of transformers up to 2,500 kVA and 33 kV. Salary according to experience and qualifications. Free passage, accommodation, medical treatment, pension scheme and kit allowance. Applications should be sent to—Box No. 4891, Electrical Times, by 31 Oct. (V 475)

LARGE Electrical Manufacturing Company in Central London require an ASSISTANT to the Head of Production Control and Progress Section. Knowledge of the Electrical Trade preferred but not essential. Opportunity for young man with ideas and ambition. Salary according to age and experience. 5-day week, Pension Scheme, Canteen. (V 516)

LONDON Engineering Sales Company has DIRECTORSHIP available to Gentleman who can bring into the company exclusive sales agency for electrical or mechanical speciality. Investment unnecessary. Fullest particulars required.—Box No. 4887, Electrical Times. (V 458)

MEDIUM-SIZED Electrical Accessory Manufacturers of high repute require live AGENTS for the following territories:

(*a*) Area operated by the South Wales Electricity Board.

(*b*) Area operated by the South West Electricity Board.

Reply giving full details of facilities offered, to Sales Manager.—Box No. 4889, Electrical Times. (V 459)

METROPOLITAN-VICKERS ELECTRICAL CO., LTD., require the services of an EXPERIENCED ESTIMATOR for their Valve and Tube Engineering Dept. Applications are invited from men about 30 years of age with experience of estimating for batch production. The post is permanent and pensionable and a good starting salary will be paid to a suitable person. Applications giving full details to: X-Ray Engineering Dept., 68 Ballards Lane, Finchley, N.3. (V 479)

NUCLEAR POWER PLANT. DRAUGHTSMEN, electrical and mechanical, are required by A. Reyrolle and Co., Ltd., at their Hebburn offices to undertake development work in connection with the control and instrumentation of nuclear reactors. Apply stating age, qualifications and experience to the Chief Engineer, A. Reyrolle and Co., Ltd., Hebburn, Co. Durham. (V 511)

ORDER CLERK required. Good prospects. Apply: Simplex Electric Co., Ltd., 217-9 Tottenham Court Rd, W.1. (V 476)

PIRELLI-GENERAL Cable Works Ltd. require DRAUGHTSMAN with knowledge of Structure Design. Overhead Railway Electrification experience an advantage. Post offers excellent prospects. Salary according to age and experience. Applications to: The Manager, Overhead Lines Department, Eastleigh, Nr. Southampton, Hants. (V 444)

PIRELLI-GENERAL Cable Works Ltd. require DRAUGHTSMAN for design work on Foundations and Structural Steelwork. Interesting post on new work offering good prospects. Apply in writing, giving qualifications, experience, age and salary expected to: The Manager, Overhead Lines Department, Eastleigh, Nr. Southampton, Hants. (V 445)

SALES REPRESENTATIVE London and Home Counties, required by Manufacturers of wiring accessories and L.T. distribution equipment. Technical education and experience essential. Knowledge of installation practice advantageous. Field selling experience necessary. Car driving and correspondence. Medical examination. Salary, commission, contributory pension, expenses and car provided. Informative letter with photograph please to—Box No. 4869, Electrical Times. (V 431)

SENIOR DRAUGHTSMEN required for design of 11 kV metalclad switchgear equipment. The position offers good prospects. Superannuation scheme. Five-day week, modern factory. Houses available to suitable applicants. Applications giving full particulars of previous experience, qualifications and salary required to the Personnel Manager, South Wales Switchgear Ltd., Blackwood, Mon. (V 447)

SENIOR TECHNICAL ENGINEER/DRAUGHTSMAN for design of Electric Control Gear. Applicants should have Higher National Certificate or equivalent. Experience in Control Gear manufacture desirable. Commencing salary according to qualifications. Apply to Vlasto Clark and Watson Ltd., Stockton Heath, Warrington. (V 528)

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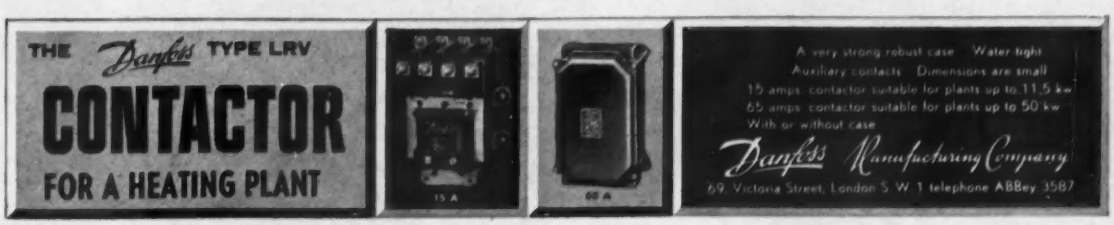
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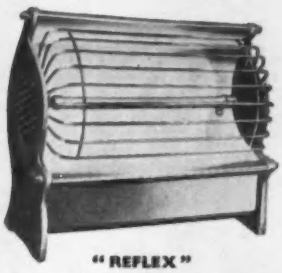

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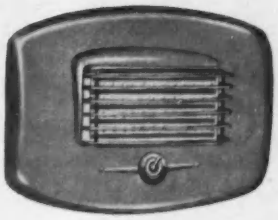

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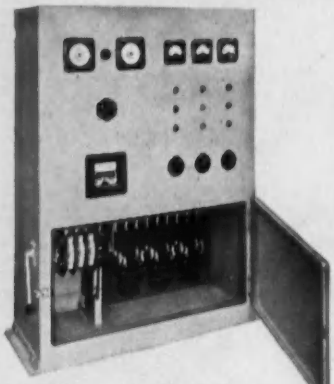

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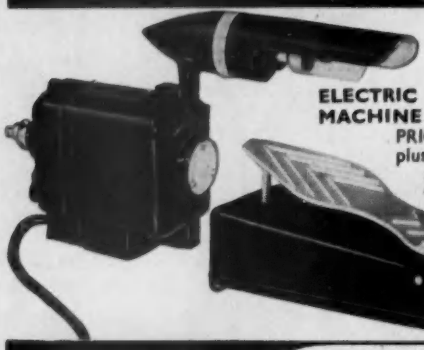

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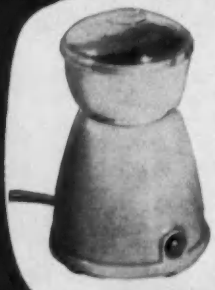

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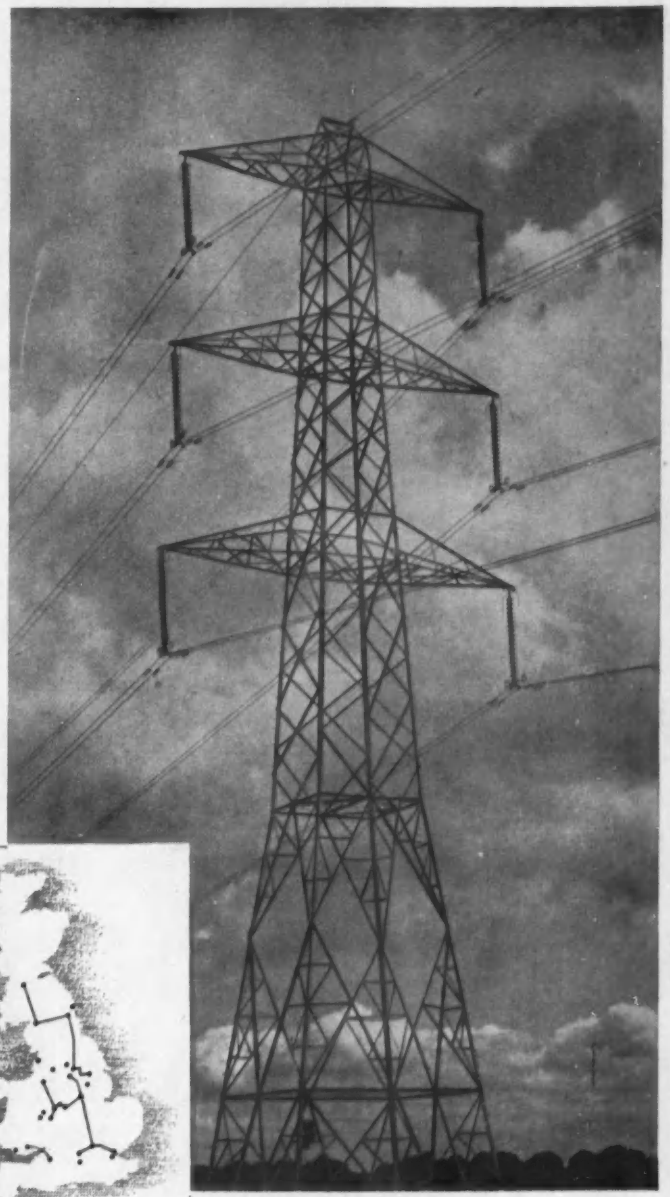

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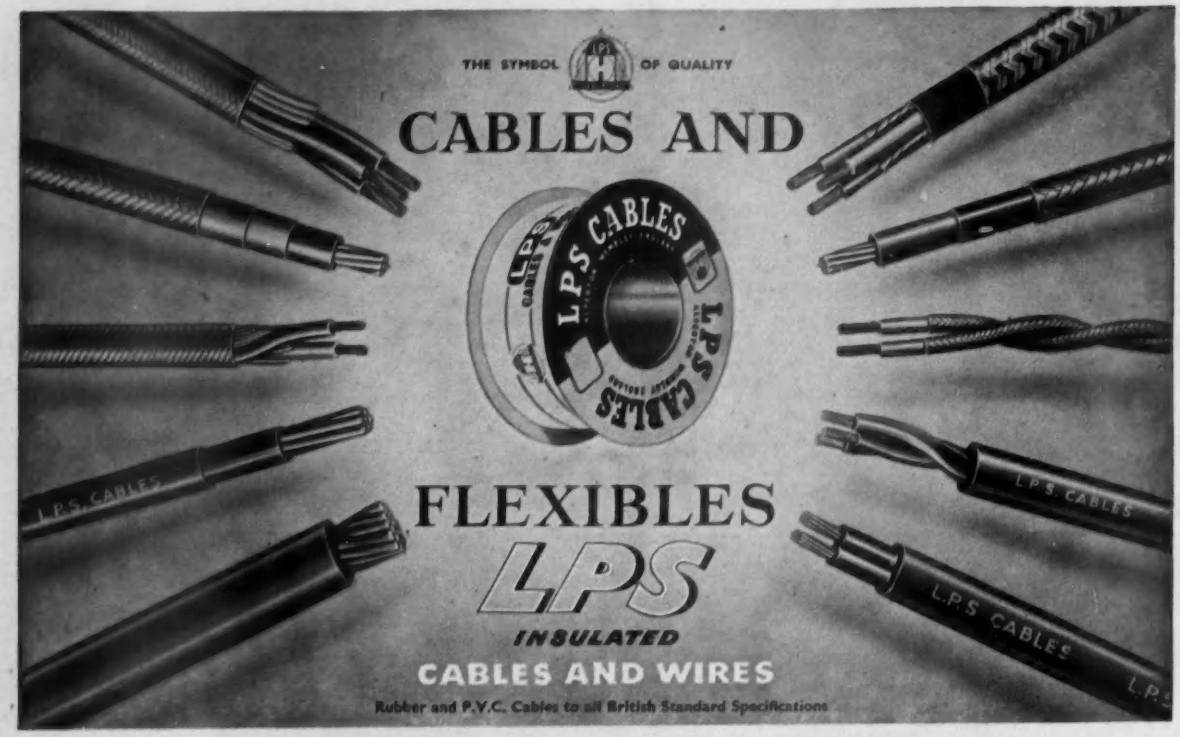

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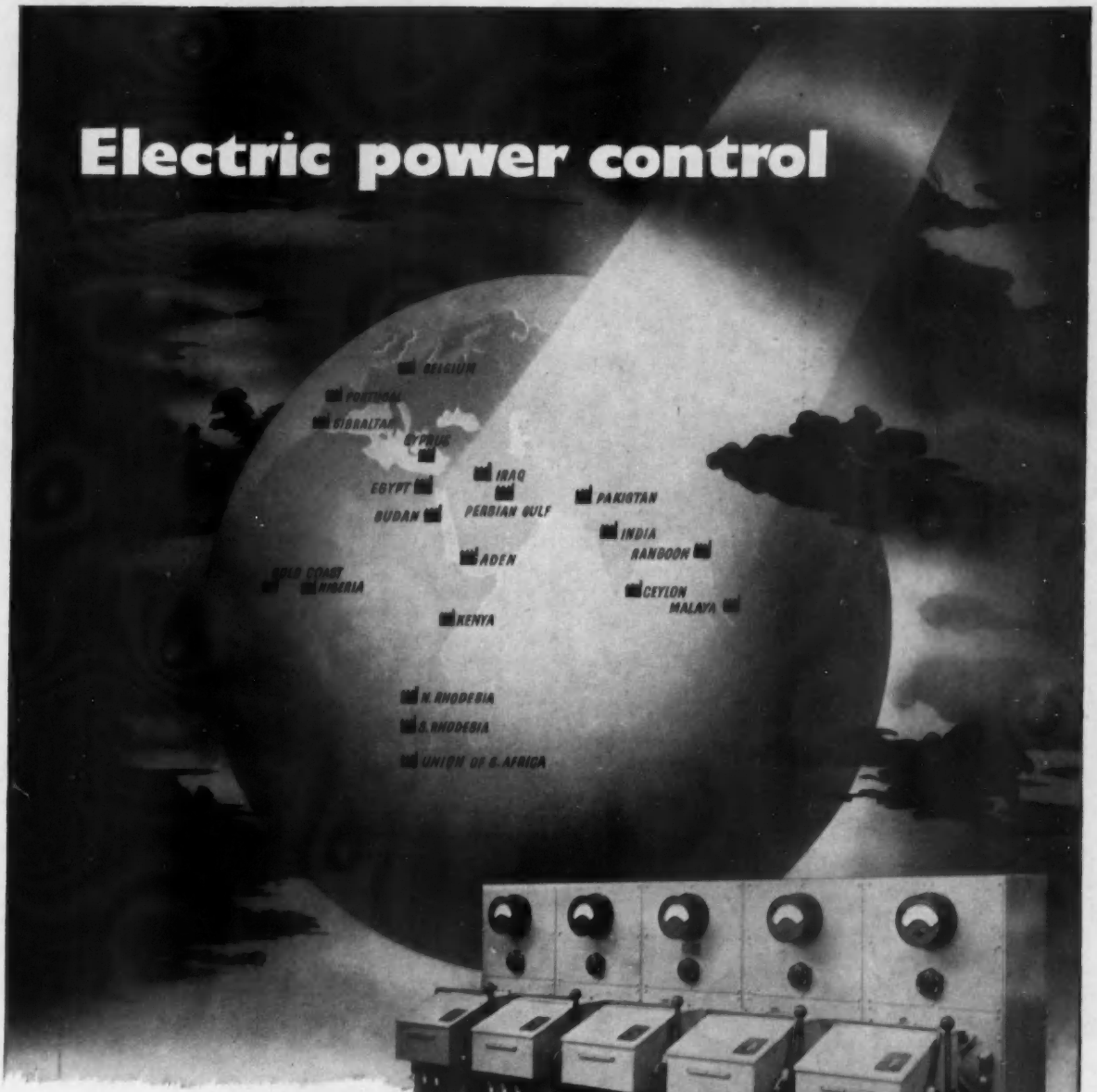

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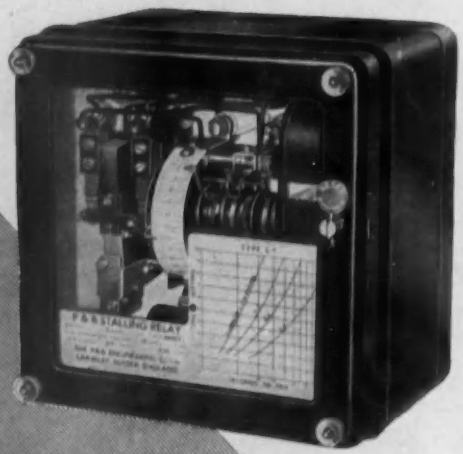

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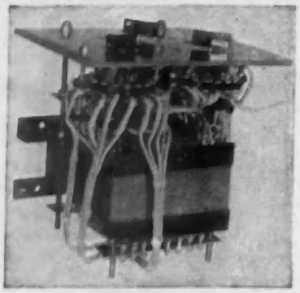

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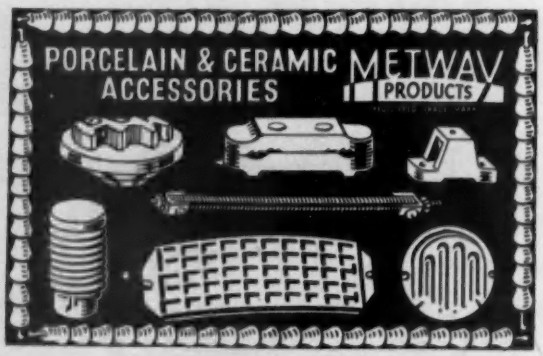

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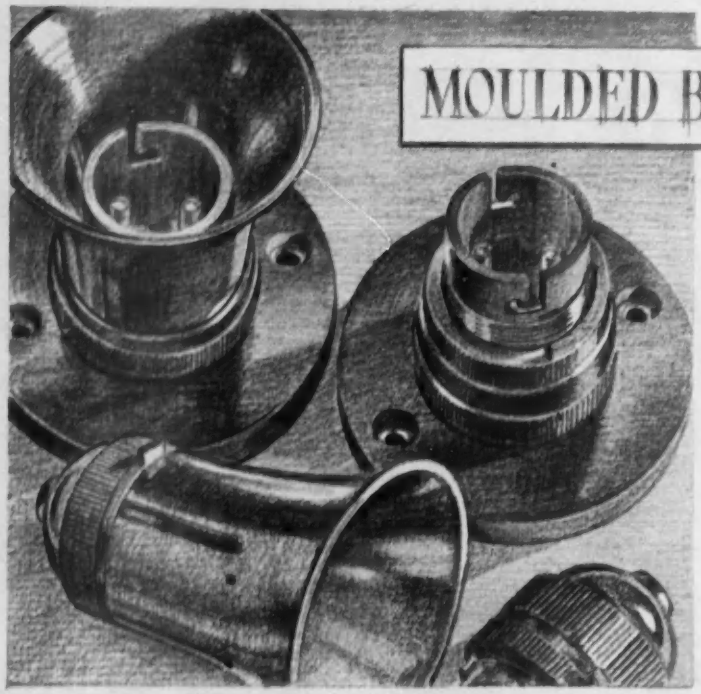

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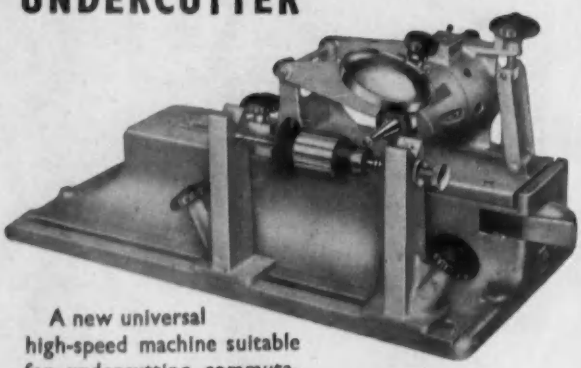

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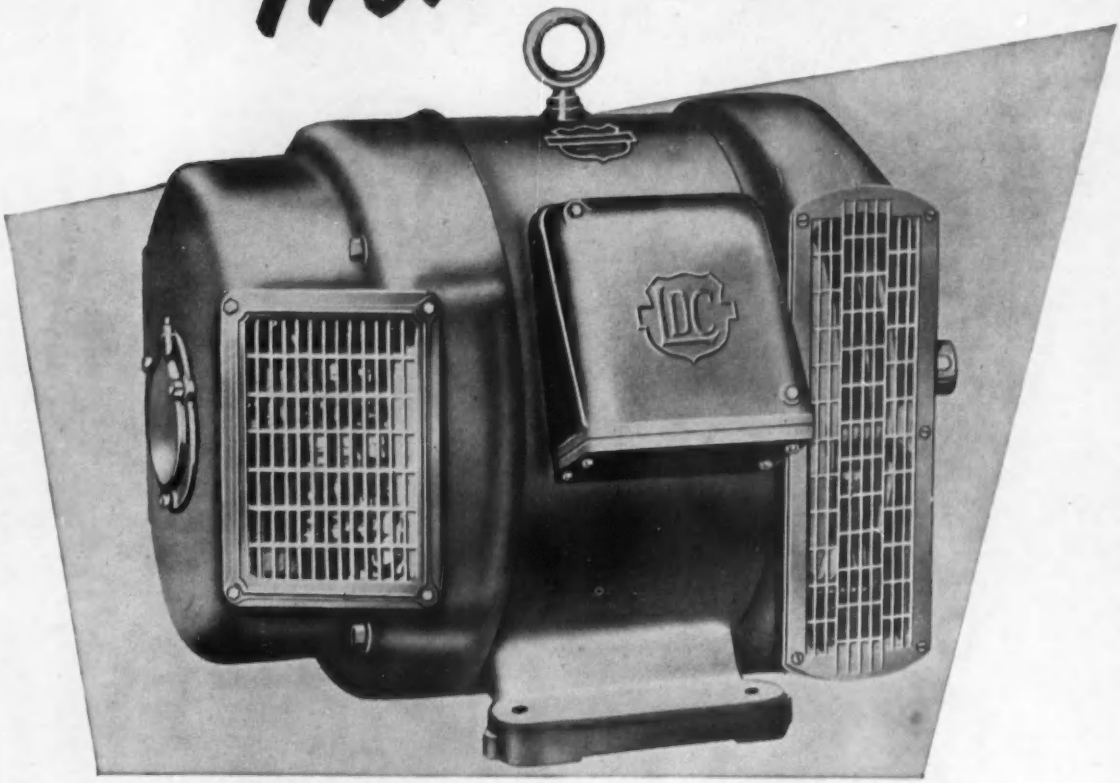

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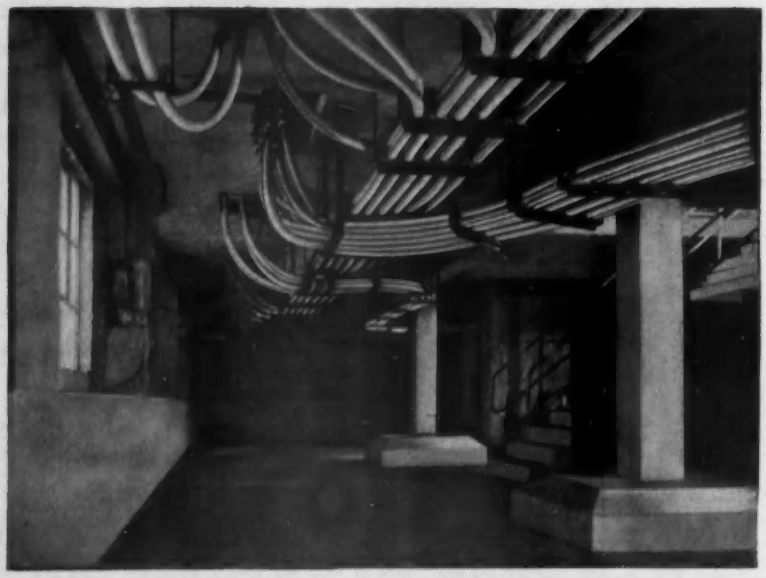

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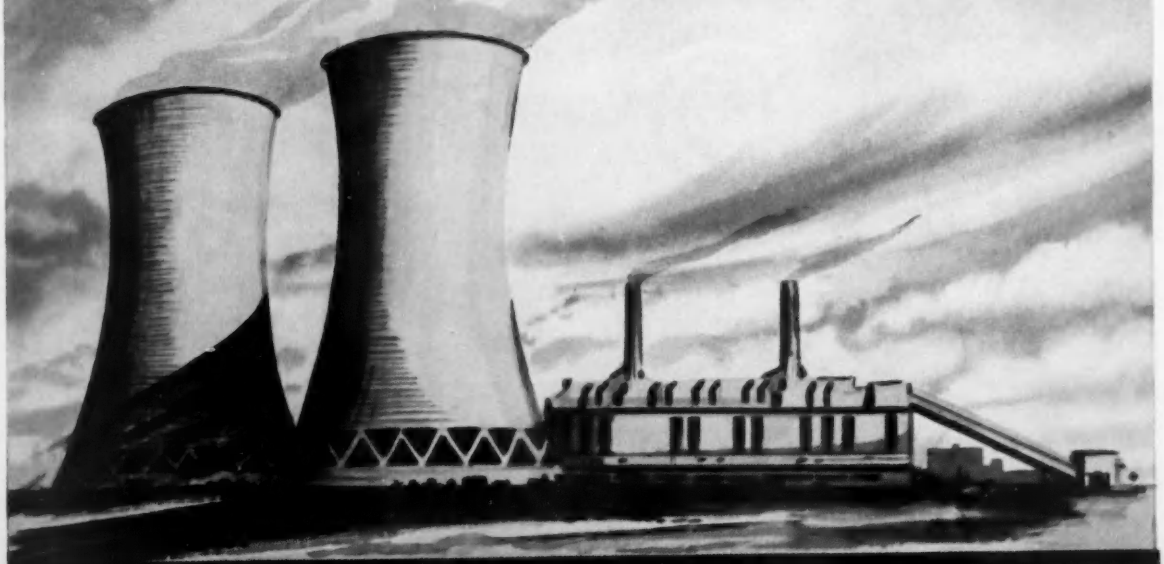

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